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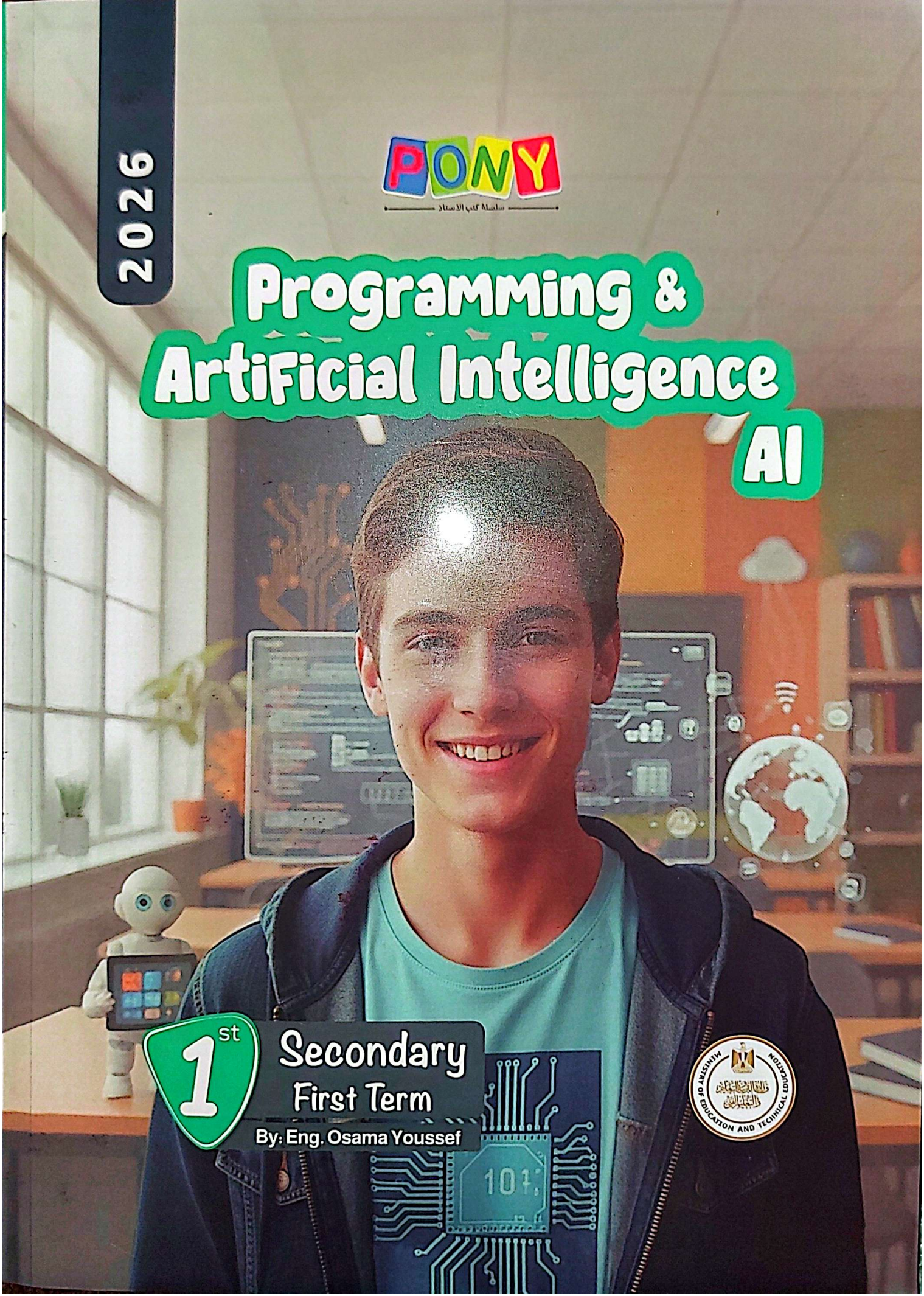
سلسلة كتب الأستاذ

Programming & Artificial Intelligence AI



1st Secondary
First Term

By: Eng. Osama Youssef

MINISTRY OF EDUCATION AND TECHNICAL EDUCATION

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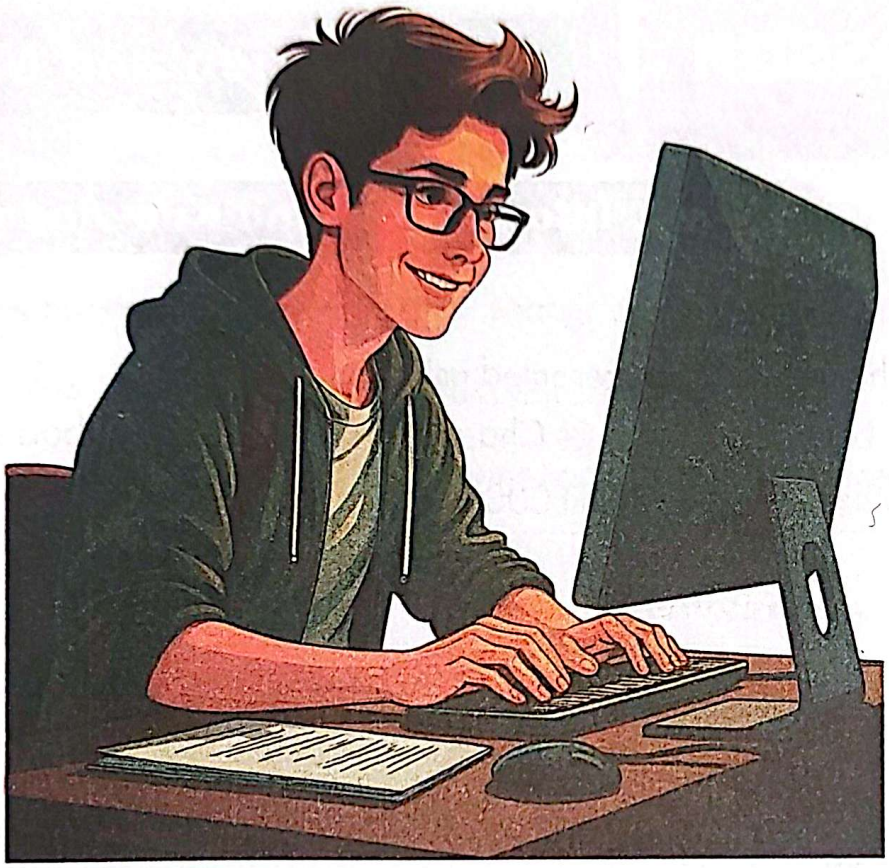
Chapter 1

What Is Information?



Chapter Lessons:

Lesson 1 Information and Media

Lesson 2 Information Ethics

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Lesson 1 Information and Media

1 Data, Information, and Knowledge

1 Data:

- They are facts represented using:
  1. Numbers
  2. Characters
  3. Symbols

Examples: 35 – A - #FF000

2 Information:

- It is something that has a **meaning** or **value** for the recipient.
- It is used as a basis for decision-making.
- Unlike data, information has no form.

Examples	Data	Information
1	35	The temperature today in Cairo is **35°C**.
2	200	The price of the new phone is **200 $**.
3	120/80	The blood pressure of the patient is **120/80**.

Characteristics of Information

1. **Persistence:** Once created, information cannot be completely erased.
2. **Reproducibility:** Information can be copied easily in large quantities.
3. **Propagation:** Information spreads easily through mass media:
   1. Newspapers
   2. TV
   3. The Internet

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Types of Information

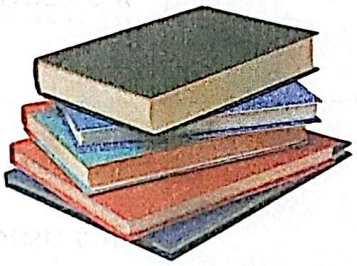
1 **Primary information:** It is the information obtained directly by yourself through:

- ❶ Personal experiences
- ❷ Research
- ❸ Surveys
- ❹ Experiments

2 **Secondary information:** It is the information not obtained directly by yourself, but through a third party.

EX

- ❶ Books
- ❷ newspapers
- ❸ television, etc.



NOTES:

- Secondary information can sometimes differ from the original information or have interpretations added to it.
- In other words, it is necessary to compare the obtained information from multiple perspectives with other information to determine its degree of accuracy and reliability. This is called cross-checking.

3 Knowledge:

» It is information that has been analyzed and systematized to aid in problem-solving.

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2 Media

1 Media:

» Media is used for conveying information to people.

Media Literacy

It's the ability to accurately interpret information obtained from media.

Types of Media

Media Name	Content	Examples
Expression Media	It's used as a means of expressing information.	① Text ② Images ③ Audio ④ Video
Propagation/ Transmission Media	It's used for the transmission and communication of information.	① Television ② Radio ③ Newspapers ④ Books ⑤ Telephone ⑥ The Internet
Recording Media	It's used for recording and storing information.	① Paper ② USB drives ③ DVDs ④ Cloud storage

أهم الكلمات والمصطلحات

Persistence	الاستمرارية	Reproducibility	قابلية التكرار والنسخ
Propagation	الانتشار	Perspectives	وجهات نظر
Third party	طرف ثالث	Interpretations	تفسيرات
Cross-checking	التحقق المتبادل	Conveying	نقـل
Expression media	وسائط الإعلام التعبيرية	Transmission media	وسائط النقل أو الإرسال
Recording media	وسائط التسجيل	Media literacy	الثقافة الإعلامية

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Lesson 1 Exercises

1 Choose the correct answer:

1 ..... represents facts or matters using numbers, characters, or symbols.

a. Information b. Data c. Knowledge d. Media

2 Which of the following is considered 'Data'?

a. Temperature values
b. A weather forecast
c. Analysis of rainfall over 10 years
d. Advice on carrying an umbrella

3 📖 Which of the following represents 'Information'?

a. Raw facts
b. Something that carries meaning or value to the recipient
c. Unclear symbols
d. Only numbers

4 📖 Knowledge means ..... .

a. copying information
b. organizing and analyzing information to solve problems
c. raw data d. rumors

5 Information on the Internet spreads widely in a short time; this describes the ..... of information.

a. reproducibility b. persistence
c. propagation d. knowledge

6 📖 Which of the following is considered a primary source of information?

a. School textbooks b. A personal experience report
c. Daily newspapers d. A television program

7 Weather forecasts are an example of ..... .

a. data b. knowledge
c. information d. expression media

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8 Rumors about people never completely disappear; this express the ..... of information.

a. persistence
b. reproducibility
c. propagation
d. all of them

9 📖 Propagation and transmission media include .....

a. DVD discs
b. radio and television
c. pictures and texts
d. cloud storage

10 ..... is considered a recording media.

a. Radio
b. USB drive
c. Telephone
d. Television

11 📖 Which of the following is considered secondary information?

a. Field surveys
b. Reports of personal experiences
c. A published scientific book
d. None of them

12 Which characteristic of information means that it cannot be completely erased once created?

a. Reproducibility
b. Propagation
c. Persistence
d. Knowledge

13 ..... means the ability to accurately interpret information obtained from media.

a. Media ethics
b. Media sharing
c. Media literacy
d. Media storage

14 A person bought a music CD and copied it many times without the sound quality changing. This describes the ..... of information.

a. persistence
b. reproducibility
c. propagation
d. media literacy

15 Which of the following is NOT a characteristic of information?

a. It has a form just like an object.
b. The meaning or value changes depending on the recipient.
c. It has the characteristic of persistence.
d. It has the characteristic of propagation.

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2 Put (✓) or (✗):

1. 🕮 Data are raw facts represented in the form of numbers, letters, or symbols. ( )
2. Information always has a form, just like an object. ( )
3. 🕮 One of the characteristics of information is that it completely disappears after being published on the Internet. ( )
4. Primary information must be cross-checked to determine its accuracy. ( )
5. 🕮 Secondary information is obtained from third party, such as books and research. ( )
6. Knowledge is information that has been analyzed and organized to solve problems. ( )
7. A website found on the Internet is always considered primary information. ( )
8. Secondary information always has the same meaning as the original information. ( )
9. 🕮 Media literacy means the ability to interpret information accurately. ( )
10. Once information spreads online, it can always be completely deleted. ( )
11. 🕮 Videos, pictures, and texts are examples of propagation media. ( )
12. Books and newspapers are examples of secondary information. ( )
13. Cross-checking means comparing information from multiple sources to check accuracy. ( )
14. Disinformation is the ability to understand and interpret information from media. ( )

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Lesson 2 Information Ethics

1 Information Ethics

Information Ethics

- They are the foundational concepts and attitudes necessary for conducting appropriate activities in the information society.
- This is regardless of the presence or absence of laws.

Points to consider when spreading information:

1 Characteristics of information on the Internet:

- Information spreads easily.
- Once disseminated, it doesn't disappear easily.

2 Infringement of others' rights:

- You must not share images or videos for which others own the copyright without permission.
- You must not leak the personal information of others on the Internet.
- You must not infringe others' privacy.
- You must not post comments that slander or defame others or engage in online bullying.

3 Geotagging:

- It is information that includes latitude and longitude embedded in photos and videos taken with smartphones and mobile phones.
- There is a risk of being identified, such as having your home pinpointed based on the location where the photo was taken.

4 Disinformation and rumors:

- It is false information that is deliberately spread or baseless rumors.

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2 Smartphones and Social Media Problems

1 Social media:

» They are platforms where individuals can connect with each other on the Internet.

2 Problems that occur with smartphones and social media:

1. **Internet addiction:** It is a state where one becomes excessively immersed in the Internet to the extent of interfering with daily life.
2. **Using smartphones while walking**
3. **Cybercrime:** It is the misuse of computers and networks for criminal activities.
4. **Identity theft:** It is the act of a third party pretending to be a certain individual or organization to steal IDs or passwords.
5. **Leakage of personal information:** It is when personal information that should remain confidential is disclosed to a third party.

أهم الكلمات والمصطلحات			
Foundational concepts	المفاهيم الأساسية	Attitudes	التوجهات
Disseminated	منتشر - متداول	Leak	يسرب
Infringe privacy	انتهاك الخصوصية	Defame others	يشوه سمعة الآخرين
Slander others	التشهير بالآخرين	Geotagging	العلامة الجغرافية
Bullying	التنمر	Latitude	خطوط الطول
Disinformation	المعلومات المضللة	Longitude	دوائر العرض
Rumors	الشائعات	Deliberately	عمدًا
Internet addiction	إدمان الإنترنت	Interfering	التدخل
Excessively immersed	منغمس بشكل مفرط	Criminal activities	أنشطة إجرامية
Disclose	يكشف	Confidential	سري

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Lesson 2 Exercises

1 Choose the correct answer:

1 ..... is the foundational concept for appropriate activity in the information society.

a. Media literacy
b. Information ethics
c. Information policy
d. Cyber ethics

2 📖 Which of the following is considered a violation of information ethics?

a. Verifying sources
b. Publishing copyrighted pictures without permission
c. Respecting privacy
d. Not using electronic passwords

3 Information on the Internet ..... .

a. is always accurate and true
b. spreads easily and is hard to erase
c. disappears quickly
d. never affects real people

4 Social media is ..... .

a. only dangerous and must be avoided
b. always safe to use freely
c. useful but can cause problems if misused
d. a tool with no effect on people's lives

5 📖 Which of the following is considered identity theft?

a. Sharing a video
b. Pretending to be someone else and stealing their account
c. Using a phone while walking
d. Spreading rumors

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6 You must not infringe others' ..... when using the Internet.

a. creativity b. privacy c. media d. account

7 ..... in photos and videos may reveal your home address.

a. Hashtags b. Comments

c. Hyperlinks d. Geotags

8 On anonymous boards, ...

a. you can say anything without consequences

b. it is always safe to post freely

c. defamation and bullying can be traced

d. nobody is affected by what is written

9 The general term for crimes involving misuse of computers or networks is ..... .

a. cyber ethics b. cybercrime

c. cyber law d. cyber safety

10 False information deliberately spread or baseless rumors are called ..... .

a. disinformation b. privacy c. spam d. copyright

11 Services that allow individuals to connect with each other online are called ..... .

a. social networking b. social engineering

c. social marketing d. all of them

12 ..... occurs when your personal data is disclosed to a third party.

a. Privacy protection

b. Data backup

c. Leakage of personal information

d. Cyber ethics

13 ..... is a state where someone spends too much time on the Internet, which affects their daily life.

a. Cybercrime b. Internet addiction

c. Social networking d. Media literacy

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14 If you find an account on Instagram using your name and photo profile without permission, this situation is called ..... .

a. cybercrime
b. identity theft
c. Internet addiction
d. disinformation

15 Spreading false or unverified information online may lead to ..... .

a. reliable information
b. privacy
c. rumors
d. speed

2 Put (✓) or (✗):

1 Social media is always dangerous and never useful. ( )

2 Geotags in photos and videos can reveal the user's location. ( )

3 Information ethics refers to the attitudes and rules needed for proper activity in the information society. ( )

4 📖 Respecting copyright and privacy is part of the information ethics. ( )

5 It is acceptable to freely post defamatory comments on anonymous message boards. ( )

6 Internet addiction is when using the Internet interferes with study, work, or health. ( )

7 When interacting online, it is important to remember there are real people on the other side. ( )

8 It is acceptable to leak the personal information of others on the Internet. ( )

9 📖 Internet addiction and using a phone while walking are among the problems related to smartphones. ( )

10 It is safe to upload pictures taken at home to the Internet without removing geotags. ( )

11 Online bullying includes posting slanderous comments. (

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Model Exams on Chapter 1

Model Exam 1

1 Choose the correct answer:

1. The representation of facts using numbers, characters, or symbols is called ..... .
   a. information b. knowledge c. data d. media
2. Which of the following represents knowledge?
   a. Temperature and humidity values
   b. Analysis results over 10 years
   c. Weather forecast d. All of them
3. Which of the following is not a characteristic of information?
   a. It has a form like an object.
   b. The meaning changes with the recipient.
   c. It has persistence. d. It has propagation.
4. If someone buy a music CD and distributes copies to his friends, this refers to ..... .
   a. propagation b. reproducibility
   c. persistence d. none of them
5. Rumors and false information that remain online for a long time refer to the ..... of information.
   a. propagation b. reproducibility
   c. persistence d. none of them

2 Put (T) or (F):

1. Data, information, and knowledge all mean the same thing. ( )
2. Information has characteristics such as persistence and propagation. ( )
3. The meaning of information never changes depending on the recipient. ( )

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4 Primary information is obtained through personal research or experience. ( )

5 Secondary information is obtained through a third party. ( )

3 Write the scientific term:

1 It is the ability to understand the meaning and characteristics of media and to accurately interpret information. (.....)

2 It is the property of information that allows it to spread widely in a short period of time. (.....)

3 It is the property of information that allows it to be copied in large quantities. (.....)

4 They are crimes involving the misuse of computers and networks. (.....)

5 It is false information that is deliberately spread or baseless rumors. (.....)

Model Exam 2

1 Choose the correct answer:

1 Emails can be sent instantly overseas; this expresses the ..... of information.

a. reproducibility b. propagation
c. persistence d. none of them

2 ..... means the ability to accurately interpret the information obtained from media.

a. Media control b. Media transmission
c. Media literacy d. Media management

3 Which of the following are propagation/transmission media?

a. Internet and radio b. USB drive and books
c. Text character d. Cloud storage

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4 The information obtained through surveys conducted by the person themselves is called ..... .

a. secondary information
b. primary information
c. processed data
d. knowledge

5 The characteristic of information that allows it to remain and not disappear easily is called ..... .

a. reproducibility
b. persistence
c. propagation
d. none of them

2 Put (T) or (F):

1 The Internet and radio are examples of recording media. ( )
2 A USB drive is an example of recording media. ( )
3 Once false information spreads online, it can easily be deleted. ( )
4 You must infringe others' privacy. ( )
5 Be respectful online and consider others when sharing information. ( )

3 Match between column (A) and column (B):

Column (A)	Column (B)
1 Data	a. Information remains and doesn't disappear easily
2 Geotagging	b. comparing obtained information with other sources to check its accuracy and reliability
3 Social media	c. Raw facts and figures such as temperature readings
4 Cross-checking	d. platforms where individuals can connect with each other on the internet
5 Persistence	e. Information that includes location embedded in photos or video

1 ..... 2 ..... 3 ..... 4 ..... 5 .....

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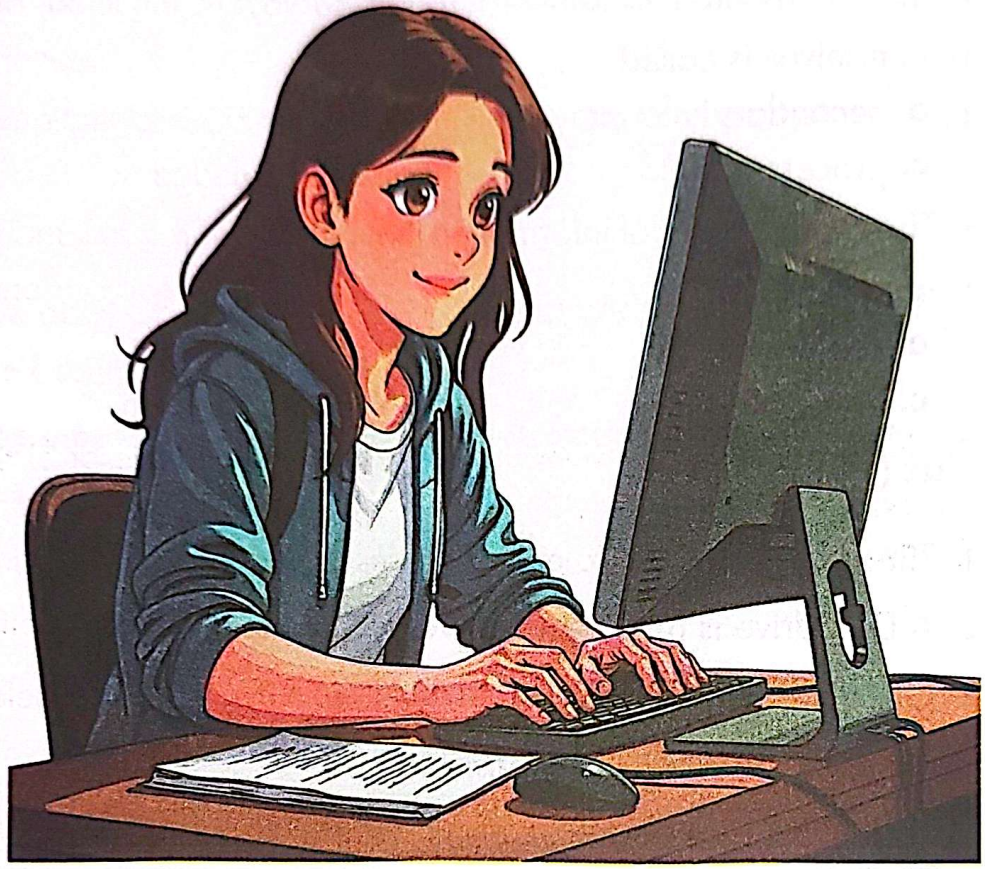
Chapter

2

Regulations and Rights in the Information Society



Chapter Lessons:

Lesson 1 Personal Information

Lesson 2 Intellectual Property Rights

Lesson 3 Utilization and Disclosure of Information

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Lesson 1 Personal Information

1 Personal Information:

- It is information related to a living person who can be identified directly or indirectly by linking it with other data.

EX

1. Name
2. Address
3. Date of birth
4. Gender
5. Phone number
6. National ID number
7. Passport number
8. Driving license
9. Any data identifying their psychological, health, or economic identity

2 Types of Personal Information:

- Four Basic Items:
  1. Name
  2. Address
  3. Date of birth
  4. Gender
- Personal Identification Codes: Numbers such as those on
  1. Passports
  2. Driver's licenses
  3. National IDs
- Special Care-Required Personal Information: Information that requires careful handling to prevent prejudice and other disadvantages, such as:
  1. Race
  2. Creed
  3. Social status
  4. Medical history
  5. Criminal record

3 Act on the Protection of Personal Information:

- It is a law that defines the proper handling of personal information.
- It states that:
  One cannot provide the personal information of an individual to a third party without the individual's consent.

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Personal information may be provided without consent:

1. When provision is based on laws and regulations.
2. When necessary for the protection of national security or public interest.
3. When necessary for the protection of human life, body, or property.
4. When especially necessary for public health or the healthy development of children.
5. When cooperating with national or local governments.

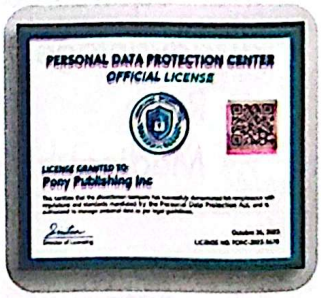
4 Protection of Privacy and Image Rights:

- **Right to Privacy:** It is the right of an individual to protect personal information that the individual does not want others to know.
- **Image Rights:** It is the right of an individual to prevent others from photographing or using their face or appearance without permission.

- **Publicity Rights:** It is a right that protects the economic interests of celebrities in their likeness and other aspects.
- These rights are recognized not by law but through court precedents.

5 Protection of Personal Information in Organizations:

- **Privacy Policy:** It is a policy that defines how companies and organizations manage personal information of customers.
- **Personal Data Protection Center License:** It is the license obtained by companies from the regulatory authority (Personal Data Protection Center) to ensure compliance with the law.



- **Prior Approval System:** It is a method in which a service provider does not collect user data or offer a service to a user unless prior consent is given.
- **Objection System:** It is a method in which a service provider continues to offer a service until the user requests the provider to discontinue the service.

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أهم الكلمات والمصطلحات

Personal information المعلومات الشخصية	Publicity rights حقوق الدعاية
Personal Identification Code رمز الهوية الشخصية	Economic interests المصالح الاقتصادية
Special Care-Required Information معلومات تتطلب عناية خاصة	Court precedents السوابق القضائية
Prejudice تحيز أو تمييز	Privacy policy سياسة الخصوصية
Race العرق	Objection System نظام الاعتراض
Creed العقيدة أو الديانة	Likeness الشبه أو المظهر الخارجي
Criminal record السجل الجنائي	Prior Approval System نظام الموافقة المسبقة
Act on the Protection of Personal Information قانون حماية المعلومات الشخصية	Personal Data Protection Center مركز حماية البيانات الشخصية
Provision تزويد أو توفير	Consent الموافقة
Public interest المصلحة العامة	Regulatory authority الهيئة التنظيمية
Property ممتلكات	Right to privacy الحق في الخصوصية
Image rights حقوق الصورة	

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Lesson 1 Exercises

1 Choose the correct answer:

1. Personal information refers to data that can ..... a specific individual.
   a. hide b. identify c. delete d. protect
2. Which of the following is an example of personal information?
   a. National ID number b. Favorite color
   c. Time zone d. None of them
3. Personal information, such as your name, address, and gender, are called ..... .
   a. general data b. basic items c. public data d. secret code
4. Information, such as your passport number or driver's license number, is called ..... .
   a. basic items b. privacy right
   c. personal identification code d. special care data
5. Information like your race, creed, social status, or medical history requires special care to avoid ..... .
   a. benefits b. sharing c. consent d. prejudice
6. The Act on the Protection of Personal Information defines rules for ..... .
   a. deleting photos b. handling personal data
   c. using software d. making websites
7. When can your personal data be shared without consent?
   a. For national security b. Human life protection
   c. Cooperation with government d. All of them
8. The ..... is the right of an individual to protect personal information that they do not want others to know.
   a. image rights b. publicity rights
   c. right to privacy d. copyrights

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9 Image rights protect people from being ..... without permission.
a. deleted b. photographed
c. ignored d. hacked

10 The right of publicity protects the economic interests of ..... .
a. teachers b. celebrities c. hackers d. students

11 Which of the following is NOT an example of personal information?
a. Driver's license number b. Eye color
c. Passport number d. Address

12 Special care-required information includes your ..... .
a. race and creed b. name and gender
c. phone number d. date of birth

13 ..... prevent people from using your photos without permission.
a. Publicity rights b. Image rights c. Copyrights d. Privacy rights

14 The privacy policy of a company explains how it ..... personal data.
a. sells b. shares publicly
c. collects and uses d. deletes

15 A prior approval system allows data collection ..... .
a. after consent b. before consent
c. without consent d. both a and b

16 In an objection system, the service continues until the user ..... .
a. pays b. agrees c. requests to stop d. upgrades

17 📖 The system that requires consent from the user before providing a service is called ..... .
a. prior consent system b. privacy policy
c. objection system d. license

18 The license that organizations obtain to confirm their commitment to data protection is called ..... .
a. Objection System b. Privacy Policy
c. Personal Data Protection License d. Prior Consent System

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2 Put (✓) or (✗):

1. Personal information refers to data that can identify a specific individual directly or indirectly. ( )
2. Personal information can always be shared without consent. ( )
3. If everyone in a photo is your family member, you can upload group photos to social media without permission. ( )
4. Race and medical history are special care-required information. ( )
5. Sharing personal information of a person rumored to be a criminal is correct behavior. ( )
6. The right to image allows anyone to photograph others freely. ( )
7. A privacy policy explains how a company manages personal information. ( )
8. In the objection system, users must give consent before data collection. ( )
9. The Act on the Protection of Personal Information defines how personal data should be handled. ( )
10. Selling T-shirts with a celebrity's photo online is acceptable. ( )
11. Personal information can always be provided to third parties without consent. ( )
12. Posting a singer's photo from a concert on social media infringes image rights. ( )
13. Image rights allow others to use your appearance freely without permission. ( )
14. Replying to unknown emails asking for personal data is safe. ( )
15. Publicity rights protect the economic interests of celebrities in their likeness. ( )

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Lesson 2 Intellectual Property Rights

Intellectual Property Rights

- They are rights that protect **creations** and **ideas** generated by human intellectual activities.
- These rights are mainly divided into two categories:
  1. Industrial Property Rights
  2. Copyrights

1 Industrial Property Rights

- They are rights primarily related to the **manufacturing** of industrial or commercial products.
- They follow the Formality Principle.
- **Formality Principle:** It means that the rights come into effect once an application is filed and registered with the **Egypt Patent Office**.

Types of Industrial Property Rights

Name	Subject of Rights	Protection Period
Patent Rights	They protect advanced **technological ideas** and **inventions**.	20 years from application
Utility Model Rights	They protect the **shape** or **structure** of products.	7 years from application
Design Rights	They protect **designs**, **shapes**, and **patterns** of products.	10 years (renewable every 5 years)
Trademark Rights	They protect **product names**, **logos**, **text**, and **sounds**.	10 years from registration (updated)

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2 Copyrights

- Copyrights are rights related to **creative works** in the **arts** and **culture**, such as:
  1. Novels
  2. Movies
  3. Paintings
  4. Photographs
  5. Music
  6. Computer programs
- They follow the Non-Formality Principle.
- **Non-Formality:** It means the rights are automatically established at the moment a copyrighted work is created, regardless of whether the creator is an amateur or a minor.

3 The Copyright Act

- It is a law that protects the rights of creators and ensures that others cannot use their works without permission.

Types of Creator's Rights:

1. **Moral Rights of Creator:** They protect the personal interests of the creator.
2. **Copyrights (Property Rights):** They protect the economic interests of the creator.

4 Neighboring Rights

- They are the rights granted to individuals or entities who communicate or transmit copyrighted works, such as:
  1. **Individuals:** singers, directors, and actors.
  2. **Companies:** record companies and broadcasting organizations.

5 Copyright Protection Period

- Protection lasts for the lifetime of the creator plus 50 years after death.

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6 Copyright Infringement:

- Reproducing or using another person's copyrighted work without permission is considered **copyright infringement**.
- It is necessary to obtain permission from the creator to use or reproduce a creator's work.
- Using a work without permission would constitute a copyright infringement.

أهم الكلمات والمصطلحات			
Intellectual Property Rights	حقوق الملكية الفكرية	Moral Rights	الحقوق الأدبية للمؤلف
Formality Principle	مبدأ الشكلية	Property Rights	الحقوق المالية
Egypt Patent Office	مكتب براءات الاختراع المصري	Neighboring Rights	حقوق المجاورة
Patent Rights	حقوق براءة الاختراع	Copyright Act	قانون حقوق النشر
Utility Model Rights	حقوق نماذج المنفعة	Copyright Infringement	انتهاك حقوق النشر
Design Rights	حقوق التصميم	Economic interests	المصالح الاقتصادية
Trademark Rights	حقوق العلامة التجارية	Non-Formality Principle	مبدأ عدم الشكلية

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Lesson 2 Exercises

1 Choose the correct answer:

1 Intellectual property rights are ..... .
- a. rights related only to industrial products
- b. rights for economic activities only
- c. rights protecting human creations and ideas
- d. none of them

2 Industrial property rights are granted by ..... after filing and registration.
- a. Egypt Patent Office
- b. United Nations
- c. Microsoft Office
- d. none of them

3 The principle under which industrial property rights take effect after registration is called ..... .
- a. Non-Formality Principle
- b. Patent Code
- c. Informal Rule
- d. Formality Principle

4 Copyrights are established ..... .
- a. when a work is created
- b. after registration at the Patent Office
- c. after ten years
- d. only for professionals

5 The protection period for copyrights lasts for the creator's lifetime plus ..... years after death.
- a. 100
- b. 50
- c. 20
- d. 10

6 The law that protects creators' rights is called the ..... .
- a. Industrial Act
- b. Information Protection Act
- c. Copyright Act
- d. Digital Creation Law

7 📖 Which of the following is considered a neighboring right to copyright?
- a. Design Rights
- b. Utility Model Rights
- c. Trademark Rights
- d. Performers' Rights, such as singers and actors

8 Which of the following rights protect inventions?
- a. Design Rights
- b. Trademark Rights
- c. Utility Model Rights
- d. Patent Rights

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9 Design rights protect ..... .
a. computer programs
b. shapes and patterns of a product
c. books and movies
d. industrial machines

10 📖 Which of the following rights protects the economic interests of creators?
a. Privacy Rights
b. Copyrights
c. Advertising Rights
d. Publishing Rights

11 📖 The Patent Rights protection period is ..... .
a. 7 years
b. 10 years
c. 20 years
d. 50 years

12 Which principle applies to copyrights?
a. Application-based
b. Non-Formality
c. Formality
d. Government registration

13 The moral rights of creators protect their ..... .
a. economic interests
b. industrial interests
c. personal interests
d. both a and b

14 Using a copyrighted work without the creator's permission is called ..... .
a. Copyright Infringement
b. Industrial Infringement
c. Patent Copying
d. Legal Use

15 Trademark rights can be renewed every ..... .
a. 20 years
b. 5 years
c. 10 years
d. 7 years

16 Copyrighted works include ..... .
a. novels
b. movies and music
c. tools and equipment
d. both a and b

17 Computer programs are a type of work covered by ..... .
a. Image Rights
b. Industrial Property Rights
c. Copyrights
d. Utility Model Rights

18 📖 Which of the following rights protect the economic interests of creators?
a. Privacy Rights
b. Copyrights
c. Advertising Rights
d. Image Rights

19 Product names, logos, text, and sound are protected by ..... .
a. Design Rights
b. Patent Rights
c. Trademark Rights
d. Utility Model Rights

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2 Put (✓) or (✗):

1. Intellectual property rights are divided into industrial property rights and copyrights. ( )
2. Industrial property rights follow the Non-Formality Principle. ( )
3. The protection period for a patent right is 20 years from the date of application. ( )
4. Copyrights are established when a work is created, even without registration. ( )
5. Utility model rights protect the names and logos of products. ( )
6. Design rights last for 10 years and can be renewed every 5 years. ( )
7. Trademark rights last 10 years but can be renewed. ( )
8. The Non-Formality Principle means you must register to get copyright protection. ( )
9. Neighboring rights apply to singers, actors, and broadcasting companies. ( )
10. Using Naguib Mahfouz's novel "Miramar" without permission violates copyrights. ( )
11. Design rights cover the technical ideas of a product's structure. ( )
12. Downloading illegally uploaded music while knowing constitutes copyright infringement. ( )
13. Copyrights protect the creator's economic and moral interests. ( )
14. Recording and sharing a movie from TV is copyright infringement. ( )
15. Copyrights are not recognized for works by amateurs or children. ( )
16. Utility model rights protect a product's shape or structure for 7 years. ( )
17. Trademark rights for logos or names can last forever if renewed. ( )
18. Neighboring rights are given to creators not only performers and record companies. ( )
19. The Formality Principle means that copyright is established only after officially registering the work. ( )

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Lesson 3 Utilization and Disclosure of Information

1 Purpose of Copyright:

- A copyright aims to contribute to cultural development by ensuring:
  1. The fair use of copyrighted works.
  2. The protection of rights.

2 Exceptions:

- Copyrighted works can be used **without permission** in the following cases:
  1. Reproduction for private use
  2. Reproduction within educational institutions
  3. Non-profit performances, etc.

3 Quotation:

- It is the act of using a portion of another person's copyrighted work in your own copyrighted work.
- Portions of a copyrighted work can be quoted **without permission** from the author.

Quotation Methods and Rules

1. Your own copyrighted work takes precedence, while the quoted work is subordinate. (Your own copyrighted work is the subject.)
2. There must be a necessity to engage in quotation.
3. Ensure that the quoted material is clearly identifiable by enclosing it in quotation marks.
4. The source is clearly specified.
5. Do not alter the quoted material.

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4 Setting the Duration of Protection:

- The economic rights of the author expire 50 years after the death of the creator.

5 Creative Commons License (CC License):

- It is a mark indicating the conditions for using copyrighted works.

Types of Creative Commons Licenses

	Condition	Content
	Credit to creator (BY)	• Display the title of the work. • Display the name of the creator.
	Non-commercial (NC)	Do not use for commercial purposes.
	No derivatives (ND)	Do not alter the original copyrighted work.
	Some terms for adaptation (SA)	Publish under the same combination of licenses as the original work.

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Lesson 3 Exercises

1 Choose the correct answer:

1 The purpose of copyright is ..... .
- a. ensuring fair use and protecting rights
- b. preventing all forms of quotation
- c. allowing infringement of intellectual property rights
- d. using works for commercial purposes only

2 Copyright aims to ensure the fair use of works and the ..... of rights.
- a. restriction
- b. removal
- c. protection
- d. suspension

3 ..... is an exception where copyrighted works can be used without permission.
- a. Reproduction for private use
- b. Commercial sales
- c. Copying for profit
- d. Uploading online

4 ..... mean(s) using a portion of another person's copyrighted work.
- a. Copyright
- b. Privacy
- c. Quotation
- d. Both a and b

5 When quoting, the quoted material must be enclosed in ..... .
- a. brackets
- b. quotation marks
- c. parentheses
- d. dashes

6 The source of the quoted material must be ..... .
- a. hidden
- b. modified
- c. mentioned
- d. removed

7 The quoted material must not be ..... .
- a. long
- b. incomplete
- c. altered
- d. complex

8 The economic rights of an author expire ..... .
- a. 10 years after death
- b. 50 years before death
- c. 100 years after death
- d. 50 years after death

9 ..... shows the conditions for using copyrighted works.
- a. Copyright
- b. Privacy
- c. CC License
- d. none of them

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10 Which of the creative commons licenses allows the use of a work provided the author's name is mentioned?

a. Non-commercial (NC) b. No derivatives (ND)
c. Credit to creator (BY) d. Same terms for adaptations (SA)

11 The creative commons mark (NC) means ..... .

a. non-commercial use b. credit to creator
c. no derivatives d. same terms for adaptations

12 The creative commons mark (ND) means ..... .

a. credit to creator b. non-commercial use
c. no derivatives d. same terms for adaptations

13 The creative commons mark (SA) means ..... .

a. credit to creator b. non-commercial use
c. no derivatives d. same terms for adaptations

14 Copyright exceptions include all of the following, EXCEPT ..... .

a. selling copies for profit b. reproduction for private use
c. reproduction in education d. non-profit performances

15 You found a poem online and copied a portion of it into your school magazine, crediting the writer but without permission; this is ..... .

a. an infringement b. a quotation
c. paraphrasing d. a public domain

2 Put (✓) or (✗):

1 Copyrighted works can never be used without permission. ( )
2 Reproduction for private use is an exception under copyright law. ( )
3 Reproduction within schools requires permission from the creator. ( )
4 Quotation allows using a portion of another person's work. ( )
5 The quoted part must be enclosed in parentheses. ( )
6 It is acceptable to alter the quoted part to suit your work. ( )
7 Performing a play from a commercially available script at a school cultural festival is permitted as a non-profit performance. ( )

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8 You must mention the source of the quoted work. ( )

9 Economic rights last for 50 years after the author's death. ( )

10 A Creative Commons License shows the conditions for using works. ( )

11 The CC mark (BY) means no commercial use. ( )

12 Citing a portion of statistical data from a website in a class report is permitted as quotation. ( )

13 The CC mark (ND) means the work may be freely changed. ( )

14 The CC mark (SA) means to share under the same license terms. ( )

15 Translating and publishing a Spanish work into Arabic without permission does not violate copyright. ( )

3 Complete the missing parts [1], [2], [3], and [4] in the table below:

	Condition	Content
	(.....(1).....)	Display the title of the work and name of the creator.
	(Non-commercial)	Do not use for (.....(2).....) purposes.
	(.....(3).....)	Do not alter the original copyrighted work.
	(.....(4).....)	Publish under the some combination of licenses as the original work.

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Model Exams on Chapter 2

Model Exam 1

1 Choose the correct answer:

1 Which of the industrial property rights protect the shape or structure of a product?
a. Trademark rights
b. Design rights
c. Utility model rights
d. Patent rights

2 Quoting a part of a text is allowed only when it is ..... .
a. the main part of the work
b. subordinate and necessary
c. for profit
d. creative

3 When you allow others to use your photo only if they display your name and don't alter the work, which Creative Commons licenses apply?
a. BY + ND
b. BY + NC
c. NC + SA
d. ND + SA

4 A famous singer's concert was uploaded online without their consent. This violates the ..... .
a. Neighboring Rights
b. Industrial Rights
c. Design Rights
d. Patent Law

5 Posting Naguib Mahfouz's novel "The Thief and Dogs" on a website without permission is ..... .
a. patent violation
b. neighboring rights
c. fair use
d. copyright infringement

2 Put (T) or (F):

1 Industrial property rights include patent rights and trademarks. ( )

2 Personal information is protected under the Act until 50 years after the individual's death. ( )

3 Trademark rights can be renewed every 10 years. ( )

4 The (NC) Creative Commons mark prohibits using works for profit. ( )

5 Copying and selling materials distributed for free is not copyright infringement. ( )

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3 Write the scientific term:

1. The information related to living individuals that can identify them. (.....)
2. A method where services are not provided without the user's consent. (.....)
3. The rights protecting inventions of things or methods. (.....)
4. Using a portion of someone else's work fairly and clearly indicated within your own text. (.....)
5. Using a copyrighted work without the creator's permission. (.....)

Model Exam 2

1 Choose the correct answer:

1. Mariam designed a new brand logo for her handmade products. To protect her logo legally, she should apply for ..... .
   a. trademark rights
   b. design rights
   c. patent rights
   d. copyrights
2. 🕮 The protection period of copyright lasts ..... .
   a. the lifetime of the creator only
   b. 20 years from publication
   c. 50 years after the creator's death
   d. a fixed 100 years
3. Sara made products using her favorite celebrity's photo and sold it. This violates the celebrity's ..... .
   a. right to privacy
   b. publicity rights
   c. industrial rights
   d. patent rights
4. Adham allowed others to use his photos online if his name is mentioned and the image is not changed. This license type is ..... .
   a. patent license
   b. public domain
   c. copyright free
   d. Creative Commons BY-ND

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5 The rights granted to a creator for producing something through intellectual activity are called ..... .

a. patent rights
b. trademark rights
c. design rights
d. intellectual property rights

2 Put (T) or (F):

1 Copyright is established when created and does not require registration. ( )

2 If everyone in a photo is your family, you can post it online without their consent. ( )

3 Quoted material must always be enclosed in quotation marks. ( )

4 The protection period for a patent right is 7 years from the application. ( )

5 The CC mark (ND) means the work may be freely changed. (F) ( )

3 Correct the underlined words:

1 The prior approval system provides services until the user's request to stop the service. (.....)

2 Publicity rights protect people's personal information from being exposed. (.....)

3 Design rights protect the economic interest of a famous authors' books. (.....)

4 Quotations always require the creator's permission to be used. (.....)

5 The Creative Commons mark "BY " means "do not alter the work." (.....)

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Model Exam 3

1 Choose the correct answer:

1. A doctor shares a patient's medical history without consent for a public health study. Which type of personal information was shared?
   a. Four basic items
   b. Personal identification code
   c. Privacy policy
   d. Special care-required personal information
2. A social media platform collects a user's data only after they agree to the terms before using the app. This method is called ..... .
   a. Prior Approval System
   b. Objection System
   c. Privacy Policy
   d. Data Retention Policy
3. A student used a paragraph from a novel in his essay with quotation marks and citation. This action is ..... .
   a. copyright infringement
   b. a quotation
   c. trademark use
   d. neighboring rights
4. Omar translated a Spanish story into Arabic and published it without permission. This action is ..... .
   a. copyright infringement
   b. fair use
   c. public right
   d. patent violation
5. A company copied another's design for furniture and sold it under its own name. This act violates the ..... .
   a. copyrights
   b. patent rights
   c. design rights
   d. neighboring rights

2 Put (T) or (F):

1. A utility model protects products' logos and brand names. ( )
2. Posting someone's health or financial status online, even with good intent, violates personal information laws. ( )
3. Posting Naguib Mahfouz's novel "EL Harafish" on a website without permission is not copyright infringement. ( )

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4 Works created by children or amateurs cannot be copyrighted. ( )

5 Creative Commons licenses allow creators to define usage conditions. ( )

3 Match:

Column (A)	Column (B)
1 Privacy Rights	a. is the organization handling industrial property right applications.
2 Utility Model Rights	b. is a license that defines sharing and usage rules.
3 Design Rights	c. protect ideas for shapes or structures of products.
4 Patent Office	d. are the rights to keep one's private life undisclosed.
5 Creative Commons	e. protect the external appearance and patterns of products.

1 ..... 2 ..... 3 ..... 4 ..... 5 .....

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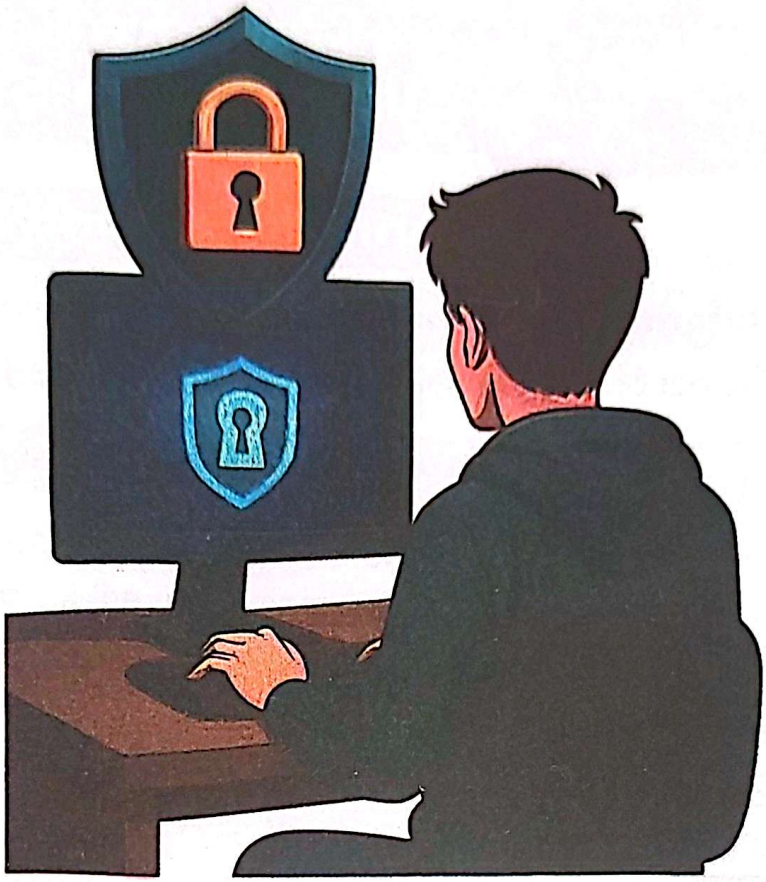
Chapter

3

Information Security



Chapter Lessons:

Lesson 1 Threats and Countermeasures in Information Security (1)

Lesson 2 Threats and Countermeasures in Information Security (2)

Lesson 3 Threats and Countermeasures in Information Security (3)

Lesson 4 Information Technology for Safety (1)

Lesson 5 Information Technology for Safety (2)

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Lesson 1 Threats and Countermeasures in Information Security (1)

1 Information Security

1 Information Security:

» It is the act of properly managing information and keeping it safe.

Elements of Information Security

1. **Confidentiality:** It is a state in which only **authorized** individuals can access the information.
2. **Integrity:** It is a state in which the information is not destroyed, tampered with, or erased.
3. **Availability:** It is a state in which information can be accessed at any time when needed.

2 Various Threats to Information Security

1 Unauthorized Access:

» It's when someone gains access to a computer system without permission.

2 Cracking:

» It's the act of unlawfully accessing a system to tamper with, erase, or steal data.

» A person who commits such acts is called a **cracker**.

3 Malware:

» It's a general term for **malicious programs** designed to harm computers.

» Infections can occur through:

1. Websites
2. Email attachments
3. USB drives
4. Networks

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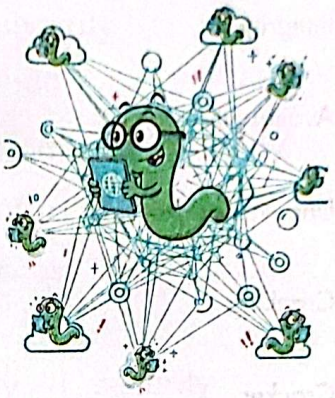
Types of Malware

1. **Computer virus:** It's a program designed to cause harm, such as destroying data or programs.
2. **Trojan horse:** It's a program disguised as a legitimate one that infiltrates a system and quietly initiates attacks.
3. **Worm:** It's a program that **replicates itself** and spreads across the Internet like a worm, expanding the infection.
4. **Spyware:** It's a program that collects personal information without the user's knowledge and sends it to third parties.



EX

- **Keylogger:** It's software that monitors and records keystrokes.
- **Adware:** It's a program that displays unwanted advertisements without the user's consent.

5. **Ransomware:** It's a program that makes data inaccessible and demands a **ransom** to restore access.

4 Cybercrime:

» They are criminal acts committed over computer networks.

Types of Cybercrime

1. **Violation of the Unauthorized Computer Access Law:**
   It means illegally accessing a computer using someone's user ID or password.
2. **Crimes involving computer or electronic records:**
   They're crimes involving tampering with stored data or unauthorized manipulation of devices.
3. **Network-based crimes:**
   They're crimes committed using networks, such as:
   A Fraud B Defamation C Copyright infringement

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أهم الكلمات والمصطلحات

Information security	أمن المعلومات	Spyware	برامج تجسس
Confidentiality	السرية	Keylogger	مسجل ضغطات المفاتيح
Integrity	النزاهة	Adware	برامج إعلانية
Availability	التوافر	Ransomware	برامج الفدية
Unauthorized access	الوصول غير المصرح به	Cybercrime	جرائم الإنترنت
Cracking	الاختراق	Network-based crimes	جرائم عبر الشبكات
Cracker	مخترق	Fraud	احتيال
Malware	برامج ضارة	Defamation	تشويه السمعة
Computer virus	فيروس كمبيوتر	Copyright infringement	انتهاك حقوق النشر
Trojan horse	حصان طروادة	Unlawfully	بشكل غير قانوني
Worm	دودة	Malicious programs	برامج ضارة
Disguised	متنكر	Infiltrates	يتسلل
Legitimate	قانوني ـ شرعي		

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Lesson 1 Exercises

1 Choose the correct answer:

1 The act of properly managing information and keeping it safe is called ..... .

a. information control
b. information security
c. information access
d. data verification

2 ..... is one of the essential elements of information security.

a. Accuracy b. Secrecy c. Availability d. None of them

3 A state in which only authorized individuals can access the information is called ..... .

a. integrity b. availability c. confidentiality d. security

4 A state in which the information is not destroyed, tampered with, or erased is known as ..... .

a. integrity
b. accessibility
c. privacy
d. protection

5 Unauthorized access refers to ..... .

a. access by the owner
b. access granted by an admin
c. access without permission
d. access through cables

6 The illegal act of accessing a system to tamper with, erase, or steal data is known as ..... .

a. debugging b. spamming c. phishing d. cracking

7 A person who unlawfully tampers with data or systems is called a/an ..... .

a. engineer b. cracker c. encoder d. coder

8 A general term for malicious programs designed to harm computers is ..... .

a. software b. firewall c. malware d. adware

9 A program disguised as a legitimate one that secretly attacks systems is called ..... .

a. worm b. virus c. Trojan horse d. keylogger

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10 A program that replicates itself and spreads across the Internet is known as ..... .

a. spyware b. worm c. Trojan d. ransomware

11 ..... is a program that collects personal information without the user's knowledge.

a. Spyware b. Ransomware
c. Adware d. Both a and b

12 A program that locks user data and demands money for recovery is called ..... .

a. spyware b. ransomware
c. keylogger d. Trojan

13 The software that monitors and records keystrokes is called ..... .

a. adware b. cracker c. Trojan d. keylogger

14 Displaying unwanted advertisements without the user's consent is caused by ..... .

a. adware b. malware c. ransomware d. worm

15 Crimes that misuse computers and networks for illegal activities are called ..... .

a. fraud b. cybercrime c. spam d. cracking

16 When a cyberattack causes a website to go down, which element is compromised?

a. Integrity b. Privacy c. Confidentiality d. Availability

17 Which of the following is NOT a type of malware?

a. Trojan horse b. Spyware c. Cracker d. Worm

18 Fraud, defamation, or copyright infringement are considered ..... .

a. unauthorized access b. cracking
c. cybercrime d. malware infection

2 Put (✓) or (✗):

1 Information security means managing information properly and keeping it safe. ( )

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2 Confidentiality ensures that anyone can access data freely. ( )
3 Integrity means that information is accurate and not tampered with. ( )
4 Availability ensures information is accessible whenever needed. ( )
5 📖 Rasomware is used to protect data and prevent loss. ( )
6 Cracking is legally accessing a computer to help the owner fix problems. ( )
7 Malware includes viruses, worms, and Trojans. ( )
8 Spyware collects personal information secretly. ( )
9 A Trojan horse looks like a safe program but secretly attacks the system. ( )
10 Ransomware locks the user's files and demands money. ( )
11 Keyloggers record what you type on the keyboard. ( )
12 Cracking is a program that shows advertisements without the user's consent. ( )
13 A cybercrime is any criminal act using computer networks. ( )
14 📖 Confidentiality, integrity, and availability are essential elements of information security. ( )
15 Unauthorized access happens when a person uses a system without permission. ( )

3 Write the Scientific Term:

1 It's the act of properly managing information and keeping it safe. (.....)
2 It's a state in which only an authorized user can access the information. (.....)
3 It's a program disguised as a legitimate one that infiltrates a system and secretly attacks. (.....)
4 It's software that monitors and records keystrokes made by the user. (.....)
5 It's a program that locks or hides data and demands money to restore access. (.....)

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Lesson 2 Threats and Countermeasures in Information Security (2)

1 Passwords

1 Password:

» It's a string of characters used to verify that the person using a given ID is the owner of the account.

2 Guidelines for Creating Passwords:

1. Use a string that is as long as possible.
2. It combines:
   - A Uppercase letters
   - B Lowercase letters
   - C Numbers
   - D Symbols
3. Do not use personal information such as your birthday, email address, or user ID.
4. Do not reuse passwords used for other services.

3 One-time-password:

» It's a password that changes at regular intervals and can only be used once.

2 Authentication

1 Authentication:

» It's the process of verifying the identity of a user on a computer or network.

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2 Types of Authentication:

Name	Method	Example
❶ Knowledge-based authentication	It's authentication using information known only to the individual.	• User ID • Password • PIN code
❷ Biometric authentication	It's authentication using physical or behavioural characteristics of the individual.	• Fingerprint • Iris • Vein pattern • Handwriting
❸ Possession-based authentication	It's authentication using an item that the individual possesses.	• IC card • One-time password • SMS-based verification

3 Additional types:

Name	Method	Example
Two-factor Authentication	It combines two **different types** of the previous factors (knowledge, biometrics, possession).	Password (knowledge) + Fingerprint (biometric)
Two-step Authentication	It performs authentication in **two steps** using two pieces of information from the **same type** of factors.	Password + one-time code

3 Information Security Measures

1 Access Control:

» It's a method that allows only authorized (verified) users to access computer systems or data.

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2 Firewall:

» It's a system installed at network entry points to:

1. Prevent unauthorized access from outside.
2. Stop data leaks from within.

3 Countermeasures Against Computer Viruses:

1. Install antivirus software to remove or isolate viruses, and keep it up to date.
2. Always keep the operating system and application software updated to prevent security holes (vulnerabilities) in the software.
3. Regularly create backups of your data.

أهم الكلمات والمصطلحات			
legitimate	شرعي - قانوني	Knowledge-based authentication	المصادقة القائمة على المعرفة
Authentication	المصادقة	Biometric authentication	المصادقة البيومترية
One-time-password	كلمة مرور لمرة واحدة	Possession-based authentication	المصادقة القائمة على الملكية
Access control	التحكم في الوصول	Vulnerabilities	الثغرات
Firewall	جدار الحماية	Data leaks	تسرب البيانات
Unauthorized access	الوصول غير المصرح به	Countermeasures	الإجراءات المضادة

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Lesson 2 Exercises

1 Choose the correct answer:

1. A password should consist of ..... .
   a. only letters
   b. only numbers
   c. only symbols
   d. all of them

2. A password that can only be used once and changes regularly is called a/an ..... .
   a. secret code
   b. temporary password
   c. one-time password
   d. encryption key

3. The process of verifying the identity of a user trying to log into a system is known as ..... .
   a. authentication
   b. authorization
   c. phishing
   d. decryption

4. Ahmed logs into his email by typing a password and then entering a code sent to his phone. This method is called ..... .
   a. biometric authentication
   b. two-factor authentication
   c. knowledge-based authentication
   d. encryption

5. A student uses her fingerprint to unlock her laptop. This type of authentication is ..... .
   a. knowledge-based
   b. possession-based
   c. biometric authentication
   d. two-step authentication

6. Using an IC card or a one-time password is an example of ..... authentication.
   a. knowledge-based
   b. biometric
   c. possession-based
   d. encryption

7. A method that performs two verifications using the same factor is called ..... .
   a. two-step authentication
   b. two-factor authentication
   c. firewall
   d. access control

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8 The process of allowing only authorized users to access system data is called ..... .

a. verification
b. access control
c. encryption
d. backup

9 A school installs software that prevents external access and blocks harmful data. This system is a/an ..... .

a. antivirus
b. backup
c. firewall
d. router

10 The software that detects and removes computer viruses is called ..... .

a. firewall
b. spyware
c. antivirus
d. backup

11 A student downloads a file infected with malware. To avoid any damage, he should regularly update his ..... .

a. password
b. antivirus software
c. firewall
d. email app

12 When the system software is not updated, attackers can use ..... to steal data.

a. firewalls
b. security holes
c. passwords
d. codes

13 Creating a copy of your data to prevent data loss or damage is called ..... .

a. authentication
b. backup
c. access control
d. encryption

14 Installing a firewall and antivirus software helps protect computers from ..... .

a. unauthorized access
b. password recovery
c. authentication
d. data sharing

15 📖 Which of the following is an example of knowledge-based authentication?

a. Fingerprint
b. Smart card
c. Password and PIN
d. SMS verification

16 📖 Two-step authentication relies on ..... .

a. two different types of factors
b. two pieces of information of the same type of factor
c. Fingerprint + password
d. SMS code + smart card

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2 Put (✓) or (✗):

1. 🕮 A password is a string of characters used to verify that a user is legitimate. ( )
2. Using the same password for several accounts improves security. ( )
3. A one-time password can be used many times until it expires. ( )
4. Biometric authentication uses the person's fingerprint, face, or handwriting. ( )
5. Knowledge-based authentication depends on something the person knows. ( )
6. Possession-based authentication depends on something the person owns, such as an IC card. ( )
7. 🕮 In two factor authentication, two different types of factors are used for verification. ( )
8. Two-step authentication uses two different types of authentication factors. ( )
9. Access control helps ensure only authorized users can access data. ( )
10. Firewalls protect computers by blocking unauthorized access from the outside. ( )
11. The antivirus software can detect and remove harmful programs. ( )
12. Ignoring operating system updates helps close security holes. ( )
13. Backups are useful when data is deleted or corrupted. ( )
14. Authentication is the process of encrypting information to keep it secret. ( )
15. A firewall and antivirus software must both be used for stronger protection. ( )
16. 🕮 It is preferable for the password to be short so that it is easy to remember. ( )
17. Authentication using a password or a personal ID is a type of biometric authentication. ( )
18. Security holes are weaknesses in the software that attackers can exploit. ( )

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Lesson 3 Threats and Countermeasures in Information Security (3)

1 Fraudulent Billing

1 Fraudulent Billing:

- It is a scam in which a person receives a bill for a service they never used.
- The purpose is to fraudulently obtain money from the recipient.

2 One-Click Fraud:

- It is a scam where clicking a URL in a website or email automatically triggers a message pretending a contract has been concluded.
- It is followed by a payment demand.

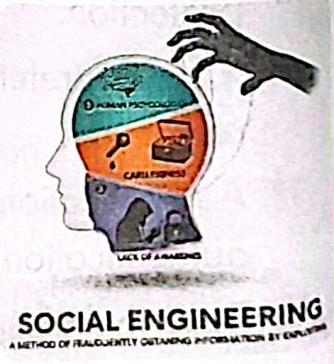
2 Unauthorized Acquisition of Information

1 Phishing:

- It is a scam that uses fake websites disguised as financial institutions or public organizations.
- It aims to steal personal information, such as PINs or account details.

2 Social Engineering:

- It is a method of fraudulently obtaining information by exploiting:
  1. Human psychology
  2. Carelessness
  3. Lack of awareness



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Examples of Social Engineering

1. **Impersonation:** It's pretending to be another person.
   EX Making a phone call as someone else to obtain information.
2. **Shoulder Surfing:** It's peeking over someone's shoulder to steal passwords or PIN code.
3. **Dumpster Diving:** It's searching through trash to obtain discarded confidential information.

3 Skimming:

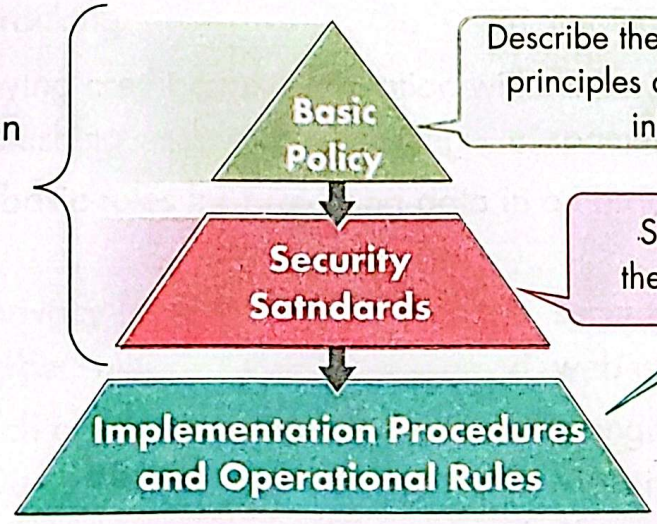
- It is the act of illegally extracting data from someone's credit or debit card.
- The stolen data can then be used to create **counterfeit cards**.

3 Information Security Policy

Information Security Policy:

- It is a **set of rules** and guidelines established by a company or an organization to maintain and protect information security.

Information Security Policy



Describe the organization's fundamental principles and declarations regarding information security.

Set out the rules for putting the basic policy into practice.

Clearly define the necessary procedures based on the target audience and intended use.

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أهم الكلمات والمصطلحات

Phishing	التصيد الاحتيالي	Information security policy	سياسة أمن المعلومات
Social engineering	الهندسة الاجتماعية	Fraudulent billing	الفوترة الاحتيالية
Impersonation	انتحال الهوية	One-click fraud	احتيال بنقرة واحدة
Shoulder surfing	التجسس من فوق الكتف	Security standards	معايير الأمان
Dumpster diving	البحث في القمامة	Implementation procedures	إجراءات التنفيذ
Skimming	نسخ بيانات البطاقة	Operational rules	قواعد التشغيل
Disguised	متنكر		

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Lesson 3 Exercises

1 Choose the correct answer:

1 Fraudulent billing is a scam that ..... .
a. demands fake payment b. sends ads
c. fixes errors d. gives discounts

2 One-click fraud happens when a user ..... .
a. opens an app b. clicks a fake link
c. enters a password d. updates the software

3 Phishing is a method used to ..... .
a. create websites b. clean storage
c. fix programs d. steal personal data

4 Social engineering attacks rely on ..... .
a. human carelessness b. human weakness
c. lack of awareness d. all of them

5 Pretending to be another person to get information is called ..... .
a. skimming b. phishing c. impersonation d. malware

6 Watching someone enter their password is called ..... .
a. shoulder surfing b. skimming c. cracking d. hacking

7 Searching through garbage to get private data is called ..... .
a. dumpster diving b. social networking
c. cracking d. coding

8 Copying credit card information without permission is ..... .
a. phishing b. skimming c. spamming d. both a and b

9 The basic rules for protecting data in an organization are called ..... .
a. privacy law b. security policy
c. cyber rule d. web guide

10 Which of the following is NOT a social engineering attack?
a. Dumpster diving b. Virus infection
c. Impersonation d. Shoulder surfing

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11 Fraudulent billing and one-click fraud both aim to ..... .

a. steal data b. crash systems

c. spread viruses d. steal money

12 Reading a company's papers from garbage is an example of ..... .

a. skimming b. cracking c. dumpster diving d. hacking

13 Social engineering obtains information through ..... .

a. tricking people b. encryption c. programming d. all of them

14 A company's written data protection rules are its ..... .

a. user's guide b. web page c. security policy d. privacy law

2 Put (✓) or (✗):

1 Fraudulent billing asks for money for services never used. ( )

2 Phishing and one-click fraud are both examples of social engineering. ( )

3 Phishing steals data through fake websites or emails. ( )

4 Social engineering depends on hardware mistakes. ( )

5 Shoulder surfing means watching someone type a password. ( )

6 Dumpster diving is checking trash to get private data of others. ( )

7 Verifying the sender's identity before sharing sensitive data helps prevent impersonation attacks. ( )

8 Skimming is a legal way to collect card information. ( )

9 A security policy protects company information. ( )

10 Phishing and skimming are the same kind of cybercrime. ( )

11 Fraudulent billing always comes from real companies. ( )

12 Security policies help reduce the risk of data leaks. ( )

13 Social engineering only uses computer programs to attack systems. ( )

14 One-click fraud never asks users to pay money. ( )

15 Shoulder surfing and dumpster diving are both physical ways of stealing data. ( )

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Lesson 4 Information Technology for Safety (1)

1 Encryption

1 Encryption:

- It is a method used when sending information to prevent it from being intercepted by anyone other than the intended recipient.
- The encrypted text is called **ciphertext**, and the original unencrypted text is called **plaintext**.

2 Decryption:

- It is the process of converting ciphertext back into its original plaintext.

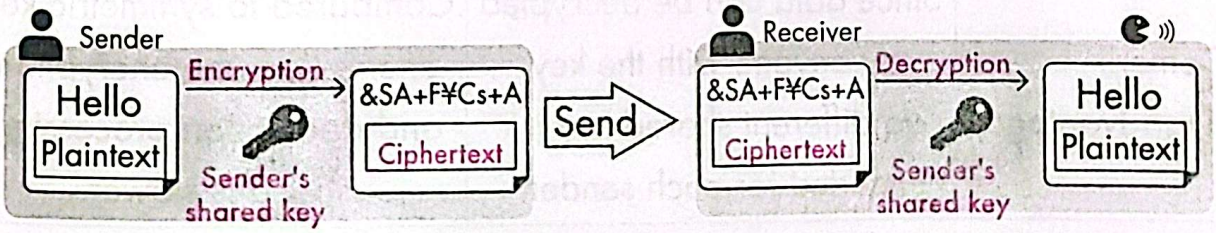
3 Key:

- It is the specific procedure or data used for encryption and decryption.

2 Types of Encryption

1 Symmetric Key Encryption:

- It is an encryption method where the same **shared key** is used for both encryption and decryption.
- The message is encrypted using the **sender's shared key** and decrypted using the **sender's shared key** that was sent in advance by the sender.



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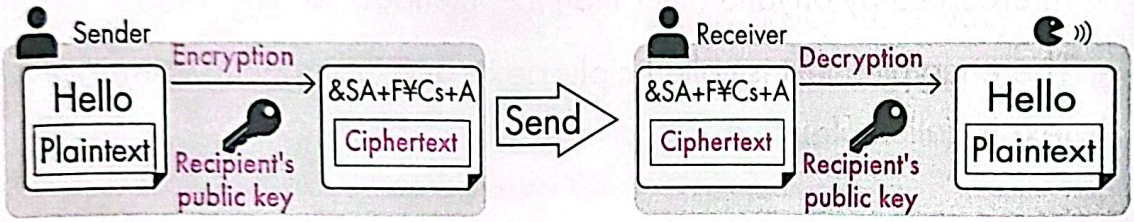
2 Public Key Encryption:

- It is an encryption method that uses a publicly shared encryption key (public key) and a private encryption key (private key).
- The message is encrypted using the recipient's public key, which was sent in advance, and decrypted using the recipient's private key, which only the recipient possesses.



Symmetric vs. Public Key Encryption

Feature	Symmetric Key Encryption	Public Key Encryption
Key Usage	It uses the same shared key for both encryption and decryption.	It uses a shared encryption key (public key) and a private encryption key.
Merit (Advantage)	The encryption and decryption processing speed is faster than public-key encryption.	As the public key can be shared freely, key management is easier.
Demerit (Disadvantage)	Since data can be decrypted by anyone with the key, a different shared key is needed for each sender.	Compared to symmetric key encryption, the encryption and decryption processing speed is slower.

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3 Session Key Method:

» It is an encryption method that **combines** symmetric key encryption and public key encryption.

أهم الكلمات والمصطلحات			
Encryption	التشفير	Recipient's public key	المفتاح العام للمستلم
Ciphertext	النص المشفر	Recipient's private key	المفتاح الخاص للمستلم
Plaintext	النص الأصلي	Processing speed is faster	سرعة المعالجة أسرع
Decryption	فك التشفير	Processing speed is slower	سرعة المعالجة أبطأ
Symmetric key encryption	تشفير المفتاح المتماثل	Session key method	طريقة مفتاح الجلسة
Shared key	مفتاح مشترك	Counterfeit card	بطاقة مزورة
Sender's shared key	المفتاح المشترك للمرسل	Information Security Policy	سياسة أمن المعلومات
Public key encryption	تشفير المفتاح العام	Fraudulent billing	فواتير احتيالية
Operational Rules	قواعد التشغيل	One-click fraud	احتيال بنقرة واحدة
Implementation Procedures	إجراءات التنفيذ	Security Standards	معايير الأمان

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Lesson 4 Exercises

1 Choose the correct answer:

1 Encryption is used to ..... .
a. lock devices b. protect information
c. store files d. fix errors

2 The original, unencrypted text is called ..... .
a. plaintext b. ciphertext c. code d. message

3 The text after encryption is called ..... .
a. compressed file b. key c. plaintext d. ciphertext

4 The process of converting ciphertext back to plaintext is called ..... .
a. decryption b. coding c. encryption d. translation

5 A key is used for ..... .
a. encryption b. decryption c. editing text d. both a and b

6 Symmetric key encryption uses ..... .
a. one shared key b. two keys c. a public key d. a private key

7 In symmetric key encryption, the same key is used by ..... .
a. the sender b. the receiver c. only one side d. both a and b

8 Public key encryption uses ..... .
a. one key b. two keys c. a shared key d. both a and b

9 The two keys used in public key encryption are ..... .
a. public keys b. private keys c. shared keys d. both a and b

10 In public key encryption, the message is encrypted using the ..... .
a. sender's key b. recipient's public key
c. recipient's private key d. both a and b

11 In public key encryption, the message is decrypted using the ..... .
a. sender's public key b. recipient's private key
c. shared key d. both a and b

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12 Compared to public key encryption, symmetric key encryption is ..... .
a. easier b. faster c. slower d. both a and b

13 Symmetric key encryption requires ..... .
a. different keys b. one key c. a shared key d. no key

14 Public key encryption makes key management ..... .
a. harder b. easier c. faster d. both a and b

15 The session key method uses ..... encryption.
a. a public key b. a symmetric key
c. both a and b d. none of them

2 Put (✓) or (✗):

1 Encryption keeps data safe from unauthorized access. ( )
2 Ciphertext is the original form of a message before encryption. ( )
3 Decryption converts plaintext into ciphertext. ( )
4 A key is necessary for both encryption and decryption. ( )
5 Symmetric key encryption uses one shared key for both the sender and receiver. ( )
6 Public key encryption uses two different keys. ( )
7 The two keys in public key encryption are called shared and secret keys. ( )
8 In public key encryption, the message is encrypted using the recipient's public key. ( )
9 The recipient decrypts the message using their private key. ( )
10 Symmetric key encryption is faster than public key encryption. ( )
11 Each sender can use the same shared key in symmetric encryption. ( )
12 The session key method combines symmetric and public key encryption. ( )
13 Public key encryption makes key management easier. ( )
14 Encryption prevents data from being read by unintended people. ( )
15 Public key encryption is faster than symmetric key encryption. ( )

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Lesson 5 Information Technology for Safety (2)

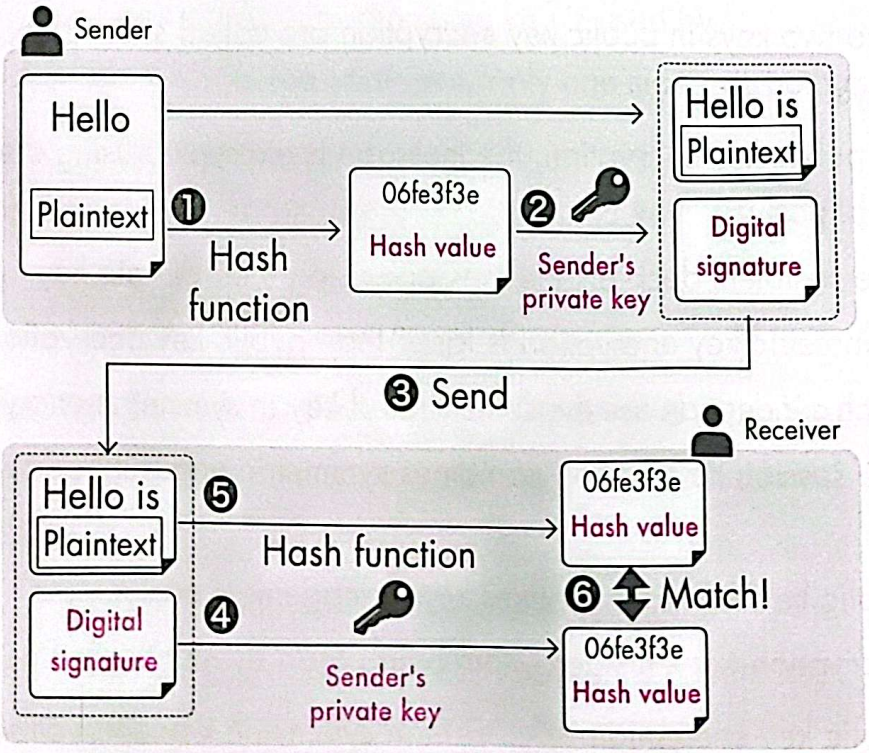
1 Digital Signatures

1 Hash Function:

- It is a function that calculates a **unique value** based on the input data.
- The value generated by the hash function is called a **hash value**.
- It is not possible to restore the original data from the hash value.

2 Digital Signature:

- It is also called **electronic signature**
- It is a technology that uses **public key** encryption and **hash values** to prove that the transmitted data is from the sender and has not been tampered with.



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Sender's Procedure:

1. Use a hash function to generate a **hash value** from the plaintext to be sent.
2. Encrypt the hash value using the **sender's private key**.
   This encrypted hash is called a **digital signature**.
3. Send both the plaintext and the digital signature to the recipient.

Recipient's Procedure:

4. Use the **sender's public key** to decrypt the received digital signature and retrieve the original hash value.
5. Use the same hash function used in step 1 to generate a new **hash value** from the received plaintext.
6. Compare the two **hash values** from steps 4 and 5.
   If they match, it proves that the message is from the sender and has not been tampered with.

3 Certification Authority (CA):

- It is a trusted third-party organization that verifies whether a public key truly belongs to its claimed owner.
- It issues **digital certificates** that include the public key and identifying information of the key owner.

2 SSL / TLS

1 SSL/TLS:

- It is a technology used to **encrypt** communication between a web server and a web browser.
- The **session key method** is used in this encryption.
- The URL of an encrypted web page begins with **"https://"**.

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2 TLS (Transport Layer Security):

- TLS was introduced as a more secure version of the originally used SSL (Secure Sockets Layer).
- Since the term "SSL" became widely recognized, the combined term SSL/TLS is often used.

أهم الكلمات والمصطلحات			
Hash function	دالة التجزئة	Certification authority (CA)	سلطة التصديق
Digital signature	التوقيع الرقمي	Digital certificates	شهادات رقمية
Electronic signature	التوقيع الإلكتروني	SSL/TLS	بروتوكول SLT/LSS
Plaintext	نص عادي	Session key method	طريقة مفتاح الجلسة
Ciphertext	نص مشفر	Transport Layer Security	أمان طبقة النقل
Sender's private key	المفتاح الخاص بالمرسل	Secure Sockets Layer	طبقة المقابس الآمنة
Sender's public key	المفتاح العام للمرسل		

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Lesson 5 Exercises

1 Choose the correct answer:

1. A function that calculates a unique value based on input data is called a/an ..... .
   a. algorithm b. encoder c. hash function d. password
2. A hash function generates a ..... .
   a. code b. hash value c. encryption d. password
3. It is ..... to restore the original data from a hash value.
   a. difficult b. possible c. not possible d. temporary
4. The encrypted hash value generated by the sender's private key is called a ..... .
   a. cipher b. code
   c. key d. digital signature
5. A digital signature uses ..... to verify the sender and detect tampering.
   a. public key encryption b. hash values
   c. a shared key d. both a and b
6. The sender encrypts the hash value with the ..... .
   a. sender's private key b. recipient's private key
   c. sender's public key d. session key
7. The recipient decrypts the digital signature using the ..... .
   a. sender's private key b. shared key
   c. sender's public key d. receiver's key
8. The recipient creates a new hash value using the ..... .
   a. browser b. same hash function
   c. new software d. both a and b
9. If both hash values match, it proves the message ..... .
   a. is genuine b. was deleted
   c. failed d. none of them

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10 A trusted third-party organization that verifies public keys and issues digital certificates is called a/an ..... .

a. server
b. Internet provider
c. certification authority
d. router

11 A digital certificate includes ..... .

a. a public key
b. an owner's information
c. an IP address
d. both a and b

12 The technology that encrypts communication between a web server and browser is ..... .

a. hash
b. SSL/TLS
c. Wi-Fi
d. HTTP

13 SSL/TLS uses the ..... method.

a. shared key
b. public key
c. session key
d. private key

14 SSL/TLS encrypts data between ..... .

a. two users
b. a server and a browser
c. computers only
d. both a and b

15 A secure web page URL begins with ..... .

a. https://
b. www://
c. ftp://
d. http://

16 TLS stands for ..... .

a. Transport Layer Security
b. Trusted Login Service
c. Total Link System
d. both a and b

17 TLS is a more secure version of ..... .

a. firewall
b. CA
c. HTTPS
d. SSL

2 Put (✓) or (✗):

1 A hash function creates a unique value from input data. ( )
2 The hash value can be changed back to its original form. ( )
3 A digital signature uses a hash value and public key encryption. ( )
4 The sender encrypts the hash value using their public key. ( )
5 The encrypted hash is called a digital signature. ( )
6 The recipient decrypts the digital signature with the sender's public key. ( )

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7 If two hash values are different, the message was not changed. ( )

8 A certification authority confirms who owns a public key. ( )

9 A digital certificate includes the public key and the owner's information. ( )

10 SSL/TLS is used to secure communication between devices. ( )

11 SSL/TLS uses the symmetric key method. ( )

12 The session key method is used in SSL/TLS. ( )

13 A secure website address starts with "https://". ( )

14 TLS was developed as an older version of SSL. ( )

15 SSL and TLS are often mentioned together because SSL is widely known. ( )

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Model Exams on Chapter 3

Model Exam 1

1 Choose the correct answer:

1. During an online class, the school network was down for several hours. This situation indicates a loss of ..... .
   a. confidentiality b. integrity c. availability d. security
2. 🕮 Which of the following malware replicates itself and spreads over the Internet?
   a. Trojan horse b. Worm c. Spyware d. Ransomware
3. The method of verifying that a user is legitimate by combining fingerprint scanning and a password is called ..... .
   a. knowledge-based authentication
   b. possession-based authentication
   c. two-factor authentication
   d. firewall verification
4. 🕮 Which of the following cybercrimes depends on using another person's username or password?
   a. Firewall
   b. Violation of unauthorized access law
   c. Manipulation of stored data d. Phone fraud
5. A company installed a system that blocks unauthorized users from outside. This system is called a ..... .
   a. Trojan horse b. keylogger c. router d. firewall

2 Put (T) or (F):

1. Malware includes computer viruses, worms, and spyware. ( )
2. 🕮 Biometric authentication relies on a person's characteristics such as fingerprints and irises. ( )
3. Dumpster diving refers to checking the computer's recycle bin for deleted files. ( )

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4 Phishing emails are designed to steal passwords and financial information. ( )

5 A one-time password can be reused for multiple logins. ( )

3 Match:

Column (A)	Column (B)
1 Cracking	a. displays advertisements that the user did not intend to see.
2 Adware	b. is malicious software including computer viruses and Trojan horses.
3 Spyware	c. is illegally extracting information from someone else's credit card or bank card.
4 Malware	d. is the act of illegally infiltrating a computer to tamper with, erase, or steal data.
5 Skimming	e. is the software that leaks the data stored on a computer to the outside.

1 ..... 2 ..... 3 ..... 4 ..... 5 .....

Model Exam 2

1 Choose the correct answer:

1 📖 Which of the following threats collects personal information without the user's knowledge?

a. Ransomware b. Spyware c. Virus d. Trojan horse

2 A bank system was attacked, and the data of customers was altered. This means ..... was compromised.

a. integrity b. confidentiality
c. availability d. access

3 The plan or rules created by an organization to maintain its data security are called ..... .

a. phishing b. availability
c. information security policy d. firewall

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4 When someone uses another person's ID and password to log in to a site without permission, this is called ..... .

a. a virus infection
b. an unauthorized access
c. a backup
d. an authentication

5 A message appeared on Nour's computer asking her to pay money to recover locked files. This attack is called ..... .

a. spyware
b. worm
c. adware
d. ransomware

2 Put (T) or (F):

1 Adware is a program that displays advertisements with the user's consent. ( )

2 A firewall prevents unauthorized access from outside a network. ( )

3 Skimming involves illegally copying data from someone's credit or debit card. ( )

4 In two-factor authentication, two different types of factors are used for verification. ( )

5 A keylogger is the person who unlawfully accesses a system to tamper with or steal data. ( )

3 Correct the underlined words:

1 Biometric authentication uses information known only to the individual. (.....)

2 Two-factor authentication performs authentication in two steps using the same type of factors. (.....)

3 Firewall is installed at network entry points to prevent authorized access. (.....)

4 Social engineering fraudulently obtains information by exploiting care of people. (.....)

5 Skimming is illegally extracting data from someone's email. (.....)

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Model Exam 3

1 Choose the correct answer:

1. Seif downloaded a free game that secretly installed a program to record his keystrokes. This is an example of ..... .
   a. spyware b. worm c. ransomware d. adware
2. 🕮 One-Time Password (OTP) is ..... .
   a. a password that never changes
   b. a password that can be used multiple times
   c. a password that changes periodically and is used only once
   d. a password based on the date of birth
3. Lina received a bill for a service she never used. This is a type of ..... .
   a. cracking b. phishing c. fraudulent billing d. adware
4. In a company, an employee was looking over another's shoulders to steal their password. This act is called ..... .
   a. dumpster diving b. shoulder surfing
   c. impersonation d. social networking
5. A person pretended to be a company employee on the phone to get confidential data. This technique is known as ..... .
   a. social engineering b. unauthorized access
   c. ransomware d. skimming

2 Put (T) or (F):

1. Access control means allowing computer systems to be accessed freely by anyone. ( )
2. Biometric authentication uses characteristics such as a Vein pattern. ( )
3. Fraudulent billing and one-click fraud are both examples of online scams. ( )
4. You should use personal information in your password to remember it. ( )

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5 Availability means that only authorized individuals can access the information. ( )

3 Write the scientific term:

1 It is being requested to pay a fee simply by clicking a link, as if you had joined or signed a contract. (.....)

2 It is pretending to be a financial institution to trick users into entering their user ID and password, which are then misused. (.....)

3 It is a basic policy established by a company or organization to maintain information security. (.....)

4 They are weaknesses in the software that attackers can exploit. (.....)

5 It is an authentication using an item that the individual possesses such as an IC card. (.....)

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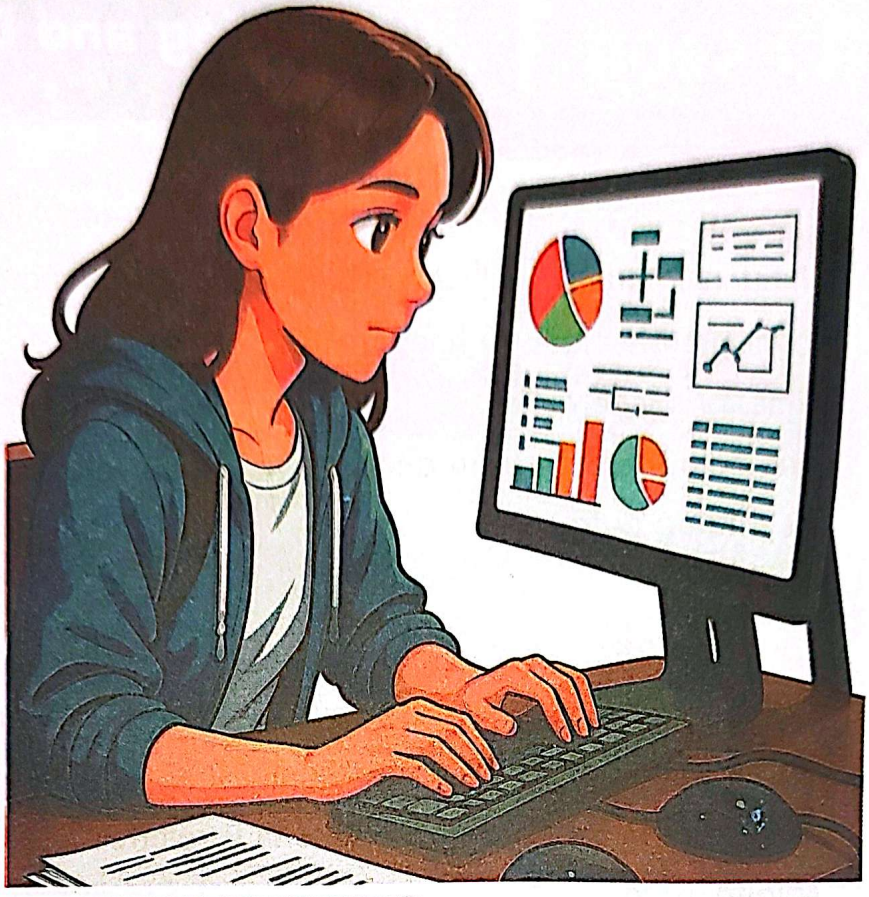
Chapter

6

Analog and Digital



Chapter Lessons:

Lesson 1 Analog and Digital

Lesson 2 Binary and Amount of Information

Lesson 3 Hexadecimal

Lesson 4 Digital Representation of Characters

Lesson 5 Numerical Calculations [1]

Lesson 6 Numerical Calculations [2]

Lesson 7 Digitalization of Sound

Lesson 8 Digitization of Images

Lesson 9 Digital Representation and Compression Technology for Videos

Lesson 10 Information Design

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Lesson 1 Analog and Digital

1 Analog:

- It refers to quantities that can be measured continuously and with fine precision, such as mass, time, or temperature.
- The data represented in analog form is referred to as analog data.

Analog

2 Digital:

- It refers to quantities that continuously change and are represented numerically by segmenting at regular intervals.
- The data represented in digital form is referred to as digital data.

Digital

3 A/D Conversion (Digitization):

- It is the process of converting analog data into digital data.

4 D/A Conversion:

- It is the process of converting digital data into analog data.

5 Advantages of Digital Data:

- It is easy to modify and edit the data.
- Data can be accumulated or duplicated without degradation.
- It is possible to efficiently communicate the information.
- It is possible to combine various types of media.

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6 Binary:

- It is a method of representing numbers using two types of digits, 0 and 1.
- In computers, all types of information—numbers, characters, audio, and images—are represented in binary.

أهم الكلمات والمصطلحات			
Analog data	بيانات تمثيلية	Accumulate	تجميع
Digital data	بيانات رقمية	Duplicate	نسخ
A/D conversion	تحويل من تمثيلي إلى رقمي	Degradation	تدهور
D/A conversion	تحويل من رقمي إلى تمثيلي	Communicate	التواصل
Modify	تعديل	Combine	دمج
Edit	تحرير	Binary	ثنائي

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Lesson 1 Exercises

1 Choose the correct answer:

1. Analog quantities are measured ..... .
   a. in binary
   b. continuously
   c. digitally
   d. randomly

2. Digital data is represented ..... .
   a. with symbols
   b. by letters
   c. numerically
   d. manually

3. Analog data includes ..... .
   a. temperature
   b. binary code
   c. emails
   d. websites

4. A/D conversion refers to ..... .
   a. copying data
   b. converting digital to analog
   c. converting analog to digital
   d. editing files

5. D/A conversion is the process of ..... .
   a. converting analog to digital
   b. duplicating data
   c. converting digital to analog
   d. deleting files

6. One advantage of digital data is that it can be ..... .
   a. erased easily
   b. modified and edited
   c. hidden from users
   d. printed

7. Digital data can be duplicated without ..... .
   a. permission
   b. degradation
   c. conversion
   d. delay

8. Communication of digital data is ..... .
   a. slow
   b. efficient
   c. limited
   d. random

9. Combining various types of media is possible with ..... .
   a. analog data
   b. binary code
   c. digital data
   d. temperature

10. Binary uses ..... .
    a. 0 and 1
    b. A and B
    c. 1 and 2
    d. X and Y

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2 Put (✓) or (✗):

1. Analog data is measured in fixed intervals. ( )
2. Digital data is segmented at regular intervals. ( )
3. A/D conversion changes digital data into analog. ( )
4. D/A conversion is used to convert digital data into analog form. ( )
5. Digital data cannot be edited. ( )
6. Analog data is easier to duplicate than digital data. ( )
7. Communication using digital data is efficient. ( )
8. Binary is a system that uses more than two digits. ( )
9. Computers represent images and audio using binary. ( )
10. Combining media types is not possible with digital data. ( )

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Lesson 2 Binary and Amount of Information

1 Bits and Bytes

1 Bit:

- A bit is the smallest unit of information.
- It has only two possible states: "0" and "1".
- One bit can represent two states, such as:
  - A switch is on or off.
  - Voltage is high or low.
  - Orientation of a magnet is north or south.
- Actual information is represented by the arrangement of bits.
- In general, n bits can represent 2^n different pieces of information.

EX

- 1 bit: 2 possibilities: 0 or 1
- 2 bits: 4 possibilities: 00, 01, 10, 11
- 3 bits: 8 possibilities: 000, 001, 010, 011, 100, 101, 110, 111

2 Byte:

- A byte is a unit consisting of 8 bits.
- The notation is B.
- 1 B = 8 bits → can represent 256 possibilities ($2^8 = 256$).
- Unit of information: The basic unit is 1 B. The unit increases every 2^{10} = 1,024 times.

EX

- 1 KB = 1,024 B
- 1 MB = 1,024 KB
- 1 GB = 1,024 MB
- 1 TB = 1,024 GB

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2 Decimal and Binary

1 Decimal:

- It is a method of representing numbers using ten digits from "0" to "9".
- A number expressed in decimal notation is called a decimal.

2 Binary:

- It is a method of representing numbers using two digits, "0" and "1".
- A number represented in binary is sometimes written with a subscript (2), such as a binary number.

3 Conversion Between Decimal and Binary

1 Conversion from Binary to Decimal:

- Start from the rightmost digit.
- Multiply each digit by 2^0, 2^1, 2^2, 2^3, ... in order.
- Sum the results.

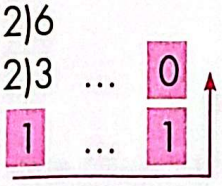
EX Convert $1011_{(2)}$ into decimal.

Answer: $(1 \times 2^0 + 1 \times 2^1 + 0 \times 2^2 + 1 \times 2^3) = 11$

2 Conversion from Decimal to Binary:

- Divide the decimal number by 2 repeatedly until the quotient becomes 1.
- Arrange the resulting remainders in reverse order from the left.

EX Convert 6 into binary.



Answer: $6 = (110_{(2)})$

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EX Express the following decimal numbers in binary.

Ⓐ 39 Ⓑ 120

Ⓐ

2)	39	
2)	19	... 1
2)	9	... 1
2)	4	... 1
2)	2	... 0
	1	... 0

Answer: $100111_{(2)}$

Add (2) to the bottom right

Ⓑ

2)	120	
2)	60	... 0
2)	30	... 0
2)	15	... 0
2)	7	... 0
2)	3	... 1
	1	... 1

Answer: $1111000_{(2)}$

أهم الكلمات والمصطلحات			
Bit	وحدة معلومات صغيرة	Conversion	تحويل
Byte	بايت	Possibilities	احتمالات
Decimal	عشري	Arrangement of bits	ترتيب البتات
Binary	ثنائي	Unit of information	وحدة المعلومات
Subscript (2)	رقم سفلي (٢)		

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Lesson 2 Exercises

1 Choose the correct answer:

1 A bit has ..... possible state(s).
a. 1 b. 2 c. 4 d. 8

2 The smallest unit of data is a ..... .
a. byte b. KB c. bit d. MB

3 A byte consists of ..... bits.
a. 4 b. 16 c. 8 d. 2

4 1 KB equals ..... .
a. 1,000 B b. 1,024 B c. 256 B d. 512 B

5 The number $1011_{(2)}$ in decimal is ..... .
a. 10 b. 11 c. 12 d. 13

6 Decimal uses digits from ..... .
a. 0 to 9 b. 0 to 1 c. A to Z d. 1 to 10

7 Binary uses ..... digits.
a. 10 b. 8 c. 2 d. 4

8 1 GB equals ..... .
a. 1,000 MB b. 1,024 MB c. 512 MB d. 2,048 MB

9 Binary numbers are sometimes written with ..... .
a. a hashtag b. a subscript (2)
c. a decimal point d. a colon

10 The process of converting decimal to binary involves ..... .
a. multiplying by 10 b. dividing by 2
c. adding digits d. subtracting values

11 How many possibilities can be represented by 3 bits?
a. 4 b. 8 c. 16 d. 6

12 The notation for a byte is ..... .
a. b b. K c. B d. M

13 Which of the following is the correct relationship between units?
a. 1 KB = 1,000 B b. 1 KB = 1,024 B
c. 1 KB = 512 B d. 1 KB = 2,048 B

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14 A byte can represent ..... different possibilities.
a. 128 b. 255 c. 256 d. 512

15 1 MB = ... KB
a. 500 b. 1,024 c. 1,000 d. 2,048

2 Put (✓) or (✗):

1 A bit can represent more than two states. ( )
2 3 bits can represent 8 different combinations. ( )
3 A byte is smaller than a bit. ( )
4 1 MB equals 1,024 KB. ( )
5 Decimal numbers use only two digits. ( )
6 Binary numbers use the digits 0 and 1. ( )
7 The binary number 1011 equals 13 in decimal. ( )
8 Decimal to binary conversion involves repeated division by 2. ( )
9 1 TB equals 1,024 GB. ( )
10 Binary numbers are written with a subscript (2) to indicate the base. ( )
11 The notation for a bit is "B." ( )
12 A bit can have only two values: 0 or 1. ( )
13 Information is represented in computers by the arrangement of bits. ( )
14 2 bits can represent 10 possibilities. ( )

3 Answer the following questions.

1 Express the following binary numbers in decimal form.
Ⓐ 101(2) Ⓑ 10101(2) Ⓒ 101101(2)

.....

.....

2 Express the following decimal numbers in binary.
Ⓐ 13 Ⓑ 128 Ⓒ 138

.....

.....

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Lesson 3 Hexadecimal

1 Hexadecimal

1 Definition of Hexadecimal:

- **Hexadecimal:** It is a method of representing numbers using the digits 0 to 9 and the letters A to F.
- A number represented in hexadecimal is sometimes written with a subscript (16) at the bottom right of the number.
  This is known as a hexadecimal number.

2 Correspondence Between Decimal, Binary, and Hexadecimal:

Decimal	Binary	Hexadecimal
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8

Decimal	Binary	Hexadecimal
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F
16	10000	10

3 Conversion Between Decimal, Binary, and Hexadecimal:

① Binary to hexadecimal:

- Separate the binary number into groups of 4 digits starting from the least significant bit.
- Convert each group into a hexadecimal value and arrange them in sequence.

EX Convert $10011010_{(2)}$ to hexadecimal.

- 1001 = 9, 1010 = A

Answer: $9A_{(16)}$

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② Hexadecimal to binary

- Convert each digit of the hexadecimal number into a 4-bit binary number.
- Arrange those numbers sequentially.

EX Convert $A4_{(16)}$ to binary:

- A = 1010, 4 = 0100

Answer: $10100100_{(2)}$

③ Hexadecimal to decimal:

- Convert the hexadecimal number to binary.
- Then, convert that binary number to decimal.

EX Convert $C6_{(16)}$ to decimal:

- C = 1100, 6 = 0110 → Binary: $11000110_{(2)}$

Answer: 198

أهم الكلمات والمصطلحات			
Hexadecimal	النظام السداسي العشري	Conversion	تحويل
Hexadecimal number	عدد سداسي عشري	Least significant bit	البت الأقل أهمية
Subscript (16)	رقم سفلي (16)	4-bit binary number	رقم ثنائي مكون من 4 بتات
Binary	ثنائي	Compact representation	تمثيل مضغوط
Decimal	عشري	Hexadecimal digit	رقم سداسي عشري

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Lesson 3 Exercises

1 Choose the correct answer:

1. Hexadecimal uses digits from ..... .
   a. 0 to 5 b. A to Z
   c. 0 to 9 and A to F d. 1 to 10
2. The subscript used for hexadecimal numbers is ..... .
   a. (2) b. (10) c. (16) d. (8)
3. The binary number $1010_{(2)}$ equals ..... in hexadecimal.
   a. 9 b. A c. B d. C
4. The hexadecimal digit F represents ..... in binary.
   a. 1111 b. 1010 c. 1100 d. 1001
5. The decimal number 15 is written in hexadecimal as ..... .
   a. D b. E c. F d. G
6. 🕮 The hexadecimal number $A4_{(16)}$ equals ..... in binary.
   a. 10100100 b. 10011010 c. 11001100 d. 10101010
7. 🕮 The binary number $10011010_{(2)}$ equals ..... in hexadecimal.
   a. A4 b. C6 c. 9A d. F0
8. The hexadecimal digit C equals ..... in binary.
   a. 1010 b. 1100 c. 1110 d. 1000
9. The decimal value of binary $11000110_{(2)}$ is ..... .
   a. 192 b. 198 c. 200 d. 204
10. The hexadecimal number $C6_{(16)}$ equals ..... in binary.
    a. 11000110 b. 10100100 c. 10011010 d. 11110000
11. The binary number $1111_{(2)}$ equals ..... in hexadecimal.
    a. D b. E c. F d. G
12. The hexadecimal digit B equals ..... in decimal.
    a. 10 b. 11 c. 12 d. 13
13. The binary number $0100_{(2)}$ equals ..... in hexadecimal.
    a. 2 b. 3 c. 4 d. 5

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14 The hexadecimal number $10_{(16)}$ equals ..... in decimal.
a. 10 b. 15 c. 16 d. 20

15 The binary number $10000_{(2)}$ equals ..... in hexadecimal.
a. F b. 10 c. C d. A

2 Put (✓) or (✗):

1 Hexadecimal numbers use letters beyond F. ( )
2 Binary numbers are grouped in fours when converting to hexadecimal. ( )
3 The hexadecimal digit A equals 10 in decimal. ( )
4 The binary number $10100100_{(2)}$ equals $A4_{(16)}$. ( )
5 Decimal numbers use only the digits 0 and 1. ( )
6 Hexadecimal numbers are more compact than binary numbers. ( )
7 The binary number $11000110_{(2)}$ equals 198 in decimal. ( )
8 The hexadecimal digit D equals 14 in decimal. ( )
9 Binary digits are always grouped in 8s when converting to hexadecimals. ( )
10 The hexadecimal number $F0_{(16)}$ equals 240 in decimal. ( )

3 Answer the following questions:

1 Convert the following binary numbers to hexadecimals, and the hexadecimal numbers to binary.
Ⓐ $11011011_{(2)}$ Ⓑ $11110110_{(2)}$ Ⓒ $9E_{(16)}$

.....

.....

2 Convert the following hexadecimal number to decimal.
$A5_{(16)}$

.....

.....

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Lesson 4 Digital Representation of Characters

1 Digital Representation of Characters

1 Character Code

» It is a **unique** numerical value assigned to each character, symbol, etc.

2 Character Code System

» It a system that summarizes the correspondence between characters and their respective character codes.

1. **ASCII Code:** It includes only:
   - Ⓐ Alphanumeric characters
   - Ⓑ Symbols
   - Ⓒ Control characters
   - It does not include Japanese characters (kanji, hiragana, or katakana).
   - Each character is represented by a binary code and a corresponding hexadecimal code.

Least Significant 4 Bits		Most Significant 4 Bits							
	Binary	0000	0001	0010	0011	0100	0101	0110	0111
Binary	Hexadecimal	0	1	2	3	4	5	6	7
0000	0	Symbols for Controlling Computers (Omission)		SP	0	@	P	'	p
0001	1			!	1	A	Q	a	q
0010	2			"	2	B	R	b	r
0011	3			#	3	C	S	c	s
0100	4			$	4	D	T	d	t
0101	5			%	5	E	U	e	u
0110	6			&	6	F	V	f	v
0111	7			'	7	G	W	g	w
1000	8			(	8	H	X	h	x
1001	9			)	9	I	Y	i	y
1010	A			*	:	J	Z	j	z
1011	B			+	;	K	[	k	{
1100	C			,	<	L	¥	l	|
1101	D			-	=	M	]	m	}
1110	E			.	>	N	^	n	~
1111	F			/	?	O	_	o	DEL

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EX

Convert the string "Hello" into binary and hexadecimal character codes:

Character	Binary Code	Hexadecimal Code
H	01001000	48
e	01100101	65
l	01101100	6C
l	01101100	6C
o	01101111	6F

② Unicode:

- Unicode is a character code standard that consolidates characters from around the world into a single character code.
- Due to differences in code assignments, there are variations such as:

Ⓐ UTF-8 Ⓑ UTF-16

3 Encoding and Decoding:

- Encoding: It is representing a string with character codes.
- Decoding: It is the opposite process, converting codes back into characters.

4 Character Corruption

- It is a phenomenon caused by mismatched encoding and decoding methods
- This leads to incorrect character display.

5 Font:

- A font is the shape data of characters corresponding to character codes.

EX

① Sans-serif ② Serif ③ Semi-cursive

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NOTES:

- To display characters on a screen or printer, two elements are required:
  1. Character code
  2. Font

أهم الكلمات والمصطلحات			
Character code	رمز الحرف	Character corruption	تلف الحروف
ASCII code	رمز ASCII	Binary code	رمز ثنائي
Hexadecimal code	رمز سداسي عشري	Sans-serif	خط بدون زوائد
Unicode	يونيكود	Serif	خط بزوائد
Decoding	فك الترميز	Semi-cursive	خط شبه مائل
Encoding	الترميز	Control characters	رموز التحكم

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Lesson 4 Exercises

1 Choose the correct answer:

1. A character code is ..... .
   a. a font style
   b. a symbol
   c. a numerical value
   d. a binary digit

2. ASCII code includes ..... .
   a. Japanese characters
   b. control characters
   c. emojis
   d. Arabic letters

3. The character "H" in binary is ..... .
   a. 01001000 b. 01100101 c. 01101100 d. 01101111

4. The hexadecimal code for "e" is ..... .
   a. 48 b. 65 c. 6C d. 6F

5. Unicode is used to ..... .
   a. display fonts
   b. encode global characters
   c. corrupt data
   d. control devices

6. UTF-8 and UTF-16 are ..... .
   a. font types
   b. encoding variations
   c. binary digits
   d. ASCII symbols

7. Encoding is the process of ..... .
   a. drawing characters
   b. converting codes to characters
   c. representing strings with codes
   d. printing fonts

8. Decoding is the opposite of ..... .
   a. corruption b. encoding c. fonting d. ASCII

9. Character corruption occurs due to ..... .
   a. font mismatch
   b. wrong binary
   c. mismatched encoding and decoding
   d. missing characters

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10 Fonts represent ..... .
a. binary digits
b. character shapes
c. hexadecimal codes
d. ASCII values

11 To display characters, we need ..... .
a. binary and ASCII
b. font and character codes
c. unicode and UTF-8
d. encoding and decoding

12 ASCII does NOT include ..... .
a. letters
b. symbols
c. kanji
d. numbers

13 The hexadecimal code for "o" is ..... .
a. 6C
b. 6F
c. 65
d. 48

14 The binary code for "l" is ..... .
a. 01101100
b. 01100101
c. 01001000
d. 01101111

15 Fonts like Serif and Sans-serif are examples of ..... .
a. encoding
b. character codes
c. font styles
d. binary digits

2 Put (✓) or (✗):

1 ASCII includes Japanese characters. ( )
2 Each character has a unique numerical code. ( )
3 Unicode supports characters from multiple languages. ( )
4 UTF-8 and UTF-16 are types of fonts. ( )
5 Encoding converts characters into codes. ( )
6 Decoding converts codes into characters. ( )
7 Character corruption is caused by correct encoding. ( )
8 Fonts are used to define the shapes of characters. ( )
9 The character "H" has the hexadecimal code 6F. ( )
10 ASCII includes control characters. ( )
11 The binary code for "e" is 01100101. ( )
12 The hexadecimal code for "l" is 65. ( )
13 Unicode is more comprehensive than ASCII. ( )
14 Fonts are not needed to display characters. ( )
15 Character codes and fonts are both required for display. ( )

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Lesson 5 Numerical Calculations [1]

1 Addition and Subtraction of Binary Numbers

» Addition and subtraction in binary numbers are performed digit by digit.

» It is just like in decimal numbers.

1 Binary Addition

» In binary addition, when the sum reaches 2, the place value carries over to the next digit.

Rules of Binary Addition:

- $0_{(2)} + 0_{(2)} = 0_{(2)}$
- $0_{(2)} + 1_{(2)} = 1_{(2)}$
- $1_{(2)} + 1_{(2)} = 10_{(2)}$ → Carry of 1 to the next digit.
- $1_{(2)} + 1_{(2)} + 1_{(2)} = 11_{(2)}$ → Carry of 1 to the next digit.

EX

$$\begin{array}{rcccc} & & 1 & & \\ & 0 & 1 & 0 & 1_{(2)} \\ + & 1 & 0 & 0 & 1_{(2)} \\ \hline (& 1 & 1 & 1 & 0_{(2)}) \end{array}$$

Carry

When two 1s are added together, a carry of 1 is generated to the next higher digit.

2 Binary Subtraction

» In binary subtraction, when the minuend is insufficient, a value of 2 is borrowed from the next higher digit.

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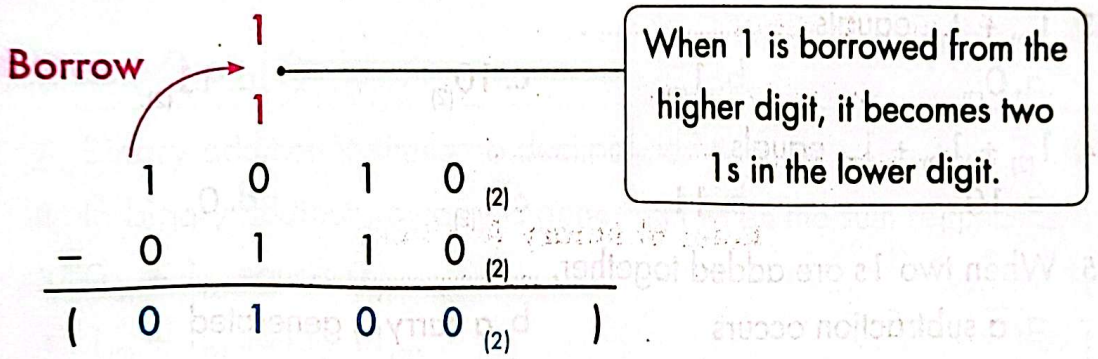
Rules of Binary Subtraction

- $0_{(2)} - 0_{(2)} = 0_{(2)}$
- $1_{(2)} - 0_{(2)} = 1_{(2)}$
- $1_{(2)} - 1_{(2)}) = 0_{(2)}$
- $10_{(2)} - 1_{(2)} = 1_{(2)}$ → Borrow from the higher digit.

EX

Subtraction of binary numbers:

$1010_{(2)} - 0110_{(2)}$



أهم الكلمات والمصطلحات			
Binary addition	الجمع الثنائي	Digit by digit	رقم برقم
Binary subtraction	الطرح الثنائي	Sum reaches 2	المجموع يصل إلى ٢
Place value	قيمة الخانة	Insufficient	غير كافٍ
Carry over	الانتقال إلى الخانة التالية	Value of 2	قيمة ٢
Minuend	المطروح منه	Binary numbers	الأعداد الثنائية
Borrowed from higher digit	الاستعارة من الخانة الأعلى	Addition of binary numbers	جمع الأعداد الثنائية
Next higher digit	الخانة الأعلى التالية	Subtraction of binary numbers	طرح الأعداد الثنائية
Two 1s	اثنان من الرقم ١		

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Lesson 5 Exercises

1 Choose the correct answer:

1. Binary addition is performed ..... .
   a. digit by digit
   b. by whole numbers
   c. randomly
   d. none of them

2. In binary addition, when the sum reaches 2, ...
   a. the number resets
   b. a carry is generated
   c. subtraction occurs
   d. it becomes 0

3. $1_{(2)} + 1_{(2)}$ equals ..... .
   a. $0_{(2)}$
   b. $1_{(2)}$
   c. $10_{(2)}$
   d. $11_{(2)}$

4. $1_{(2)} + 1_{(2)} + 1_{(2)}$ equals ..... .
   a. $10_{(2)}$
   b. $11_{(2)}$
   c. $1_{(2)}$
   d. $0_{(2)}$

5. When two 1s are added together, ...
   a. a subtraction occurs
   b. a carry is generated
   c. the result is 0
   d. borrowing happens

6. Binary subtraction is performed ..... .
   a. digit by digit
   b. using decimal rules
   c. with multiplication
   d. randomly

7. In binary subtraction, when the minuend is insufficient, ...
   a. a carry is generated
   b. a value of 2 is borrowed
   c. the result is 0
   d. the operation stops

8. $1_{(2)} - 0_{(2)}$ equals ..... .
   a. $0_{(2)}$
   b. $1_{(2)}$
   c. $10_{(2)}$
   d. $11_{(2)}$

9. $1_{(2)} - 1_{(2)}$ equals ..... .
   a. $0_{(2)}$
   b. $1_{(2)}$
   c. $2_{(2)}$
   d. $11_{(2)}$

10. $10_{(2)} - 1_{(2)}$ equals ..... .
    a. $0_{(2)}$
    b. $1_{(2)}$
    c. $10_{(2)}$
    d. $11_{(2)}$

11. When 1 is borrowed from the higher digit, it becomes ..... .
    a. two 0s
    b. two 1s
    c. one 0
    d. one 1

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12 Binary numbers are added ..... .

a. digit by digit
b. using subtraction
c. with decimal rules
d. randomly

13 Binary subtraction uses ..... when needed.

a. carrying
b. borrowing
c. addition
d. multiplication

14 $0_{(2)} - 0_{(2)}$ equals ..... .

a. $0_{(2)}$
b. $1_{(2)}$
c. $10_{(2)}$
d. $11_{(2)}$

15 $0101_{(2)} + 1001_{(2)}$ is an example of ..... .

a. decimal addition
b. binary subtraction
c. binary addition
d. none of them

2 Put (✓) or (✗):

1 Binary addition is similar to decimal addition. ( )
2 In binary addition, a carry is generated when the sum reaches 2. ( )
3 $0_{(2)} + 1_{(2)}$ equals $0_{(2)}$. ( )
4 $1_{(2)} + 1_{(2)}$ equals $11_{(2)}$. ( )
5 Binary subtraction does not use borrowing. ( )
6 $1_{(2)} - 0_{(2)}$ equals $1_{(2)}$. ( )
7 $1_{(2)} - 1_{(2)}$ equals $0_{(2)}$. ( )
8 $10_{(2)} - 1_{(2)}$ equals $1_{(2)}$. ( )
9 Binary subtraction is performed digit by digit. ( )
10 $1010_{(2)} - 0110_{(2)}$ is an example of binary addition. ( )

3 Perform the following binary calculations:

1 $0101_{(2)} + 0110_{(2)}$
2 $1101_{(2)} + 0010_{(2)}$
3 $1101_{(2)} - 0010_{(2)}$
4 $1010_{(2)} - 0101_{(2)}$

.....

.....

.....

.....

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Lesson 6 Numerical Calculations [2]

1 Representation of Negative Numbers Using Complements

1 What Is a Complement?

- A complement is used to represent negative numbers in computers.
- It is the smallest number that, when added to a natural number, produces a carry to the next higher digit.

2 Decimal Complements (10's Complement)

- In decimals, the 10's complement is the smallest number which, when added, produces a carry to the next higher digit.

EX

- The 10's complement of 71 is 29.
- The 10's complement of 635 is 365.

3 Binary Complements (2's Complement)

- In binary, the 2's complement is the smallest number which, when added, produces a carry to the next higher digit.
- How to calculate the 2's complement:
  1. Invert each digit of the original binary number:
     - Change 0s to 1s and 1s to 0s.
  2. Add 1 to the result.

EX

- Original binary number: $0101_{(2)}$
- After inversion: $1010_{(2)}$
- After adding 1: $1011_{(2)}$ → This is the 2's complement.

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2 Subtraction Using Complements

- Computers perform subtraction by using addition with complements.

Subtraction Process:

1. Find the complement of the subtrahend.
2. Use the complement to perform addition.
3. Ignore the leading digit of the result to get the final answer.

EX Decimal Subtraction of (8 − 6)

1. 10's complement of 6 → 104
2. 8 + 4 = 12
3. Ignore the leading digit → 2

Answer: 8 – 6 = 2

EX Binary Subtraction of ($1000_{(2)} - 0111_{(2)}$)

1. 2's complement of $0111_{(2)} \rightarrow 1001_{(2)}$
2. $1000(2) + 1001_{(2)} = 10001_{(2)}$
3. Ignore the leading digit → $0001_{(2)}$

Answer: $1000_{(2)} - 0111_{(2)} = 0001_{(2)}$

اهم الكلمات والمصطلحات			
Complement	المكمل	Binary number	عدد ثنائي
10's complement	مكمل العدد ١٠	Decimal number	عدد عشري
2's complement	مكمل العدد ٢	Subtrahend	المطروح
Carry to next digit	الانتقال إلى الخانة التالية	Addition with complements	الجمع باستخدام المكملات
Invert digits	عكس الأرقام	Negative numbers	الأعداد السالبة
Subtraction using complements	الطرح باستخدام المكملات	Mechanically obtain	الحصول عليه آليًا
Leading digit	الرقم الأول في الناتج		

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Lesson 6 Exercises

1 Choose the correct answer:

1. Complements are used to represent ..... in computers.
   a. positive numbers b. negative numbers
   c. decimal numbers d. all of them
2. A complement is the smallest number that ..... .
   a. produces a carry b. multiplies the digit
   c. subtracts the digit d. none of them
3. The 10's complement of 71 is ..... .
   a. 71 b. 29 c. 365 d. 104
4. The 10's complement of 635 is ..... .
   a. 635 b. 104 c. 365 d. 329
5. The 2's complement of $0101_{(2)}$ is ..... .
   a. $1010_{(2)}$ b. $0101_{(2)}$ c. $1001_{(2)}$ d. $1011_{(2)}$
6. To calculate the 2's complement, you must ..... .
   a. add 2 b. invert digits and add 1
   c. multiply by 2 d. subtract 1
7. Inverting $0101_{(2)}$ gives ..... .
   a. $1010_{(2)}$ b. $0101_{(2)}$ c. $1001_{(2)}$ d. $1111_{(2)}$
8. Subtraction in computers is performed by ..... .
   a. multiplication b. division
   c. addition with complements d. none of them
9. In subtraction, the first step is to find the ..... .
   a. sum b. complement
   c. product d. difference
10. In subtraction, the final step is to ..... .
    a. add the digits b. multiply the result
    c. ignore the leading digit d. invert the result
11. The 2's complement of $0111_{(2)}$ is ..... .
    a. $0111_{(2)}$ b. $1001_{(2)}$ c. $1010_{(2)}$ d. $1011_{(2)}$

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12 $1000_{(2)} - 0111_{(2)}$ is calculated by ..... .

a. direct subtraction
b. adding $1001_{(2)}$
c. inverting digits
d. none of them

13 The result of $1000_{(2)} + 1001_{(2)}$ is ..... .

a. $1001_{(2)}$ b. $0001_{(2)}$ c. $10001_{(2)}$ d. $1011_{(2)}$

14 After subtraction, the digit to be ignored is ..... .

a. the last digit
b. the middle digit
c. the leading digit
d. none of them

15 The complement method is used for ..... .

a. addition only
b. subtraction only
c. both addition and subtraction
d. multiplication

2 Put (✓) or (✗):

1 Complements are used to represent positive numbers. ( )
2 The 10's complement of 71 is 329. ( )
3 The 2's complement of $0101_{(2)}$ is $1010_{(2)}$. ( )
4 Inverting digits means changing 0s to 1s and 1s to 0s. ( )
5 Subtraction in computers is done using addition with complements. ( )
6 The first step in subtraction is to find the sum. ( )
7 The final step in subtraction is to ignore the leading digit. ( )
8 The 2's complement of $0111_{(2)}$ is $1001_{(2)}$. ( )
9 $1000_{(2)} - 0111_{(2)}$ equals $10001_{(2)}$. ( )
10 The complement method simplifies subtraction in computers. ( )

3 Answer the following questions.

1 What are the complements of the following binary numbers?

Ⓐ $0111_{(2)}$ Ⓑ $1011_{(2)}$ Ⓒ $10011011_{(2)}$ Ⓓ $11000110_{(2)}$

2 Use complements to perform the following binary subtractions.

Ⓐ $1010_{(2)} - 0110_{(2)}$ Ⓑ $1011_{(2)} - 1001_{(2)}$ Ⓒ $1100_{(2)} - 0010_{(2)}$

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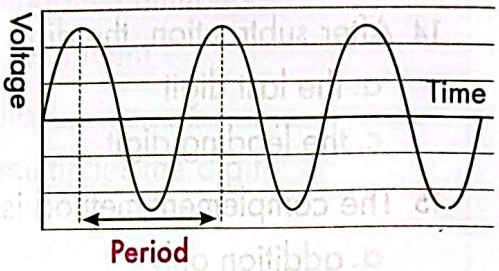
Lesson 7 Digitalization of Sound

1 Sound

- Sound is a phenomenon transmitted through the vibration of air.
- It can exist as an analog waveform.
- For audio data, sound is converted into digital data.



Important Terms:

1. **Frequency:** It is the number of waves contained in one second.
   - Unit: Hertz (Hz)
2. **Period:** It is the time it takes for one wave to propagate.
   - Unit: Second

2 Digitalization of Sound

- Digitalization means converting analog audio data into digital form that computers can process and store.

1 Pulse Code Modulation (PCM) Method:

- It is a method used to digitize audio analog data by converting sound into binary code.

Steps for Digitizing Sound Using the PCM Method

1. **Sampling:**
   - The horizontal axis (time) is divided at regular intervals.
   - The wave height (voltage strength) is extracted.
   - These extracted points are called sample points.
   - Sampling Period: It is the time interval used when dividing samples.
   - Sampling Frequency: It is the number of samples taken per second.

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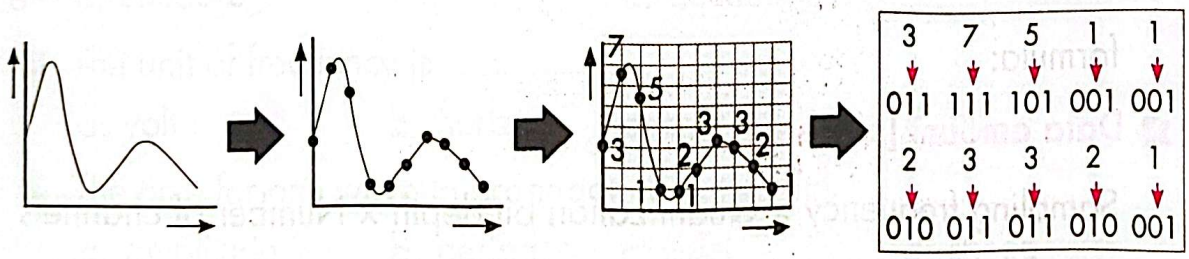
2 Quantization:

- The vertical axis (voltage) is divided at regular intervals.
- Each sampled value is converted to the nearest quantization level.
- Quantization Bit Depth: It determines the number of levels into which the range is divided.

3 Encoding:

- It converts the quantized values into the binary form.



2 Digitization and Data Volume

- As the sampling frequency and quantization bit depth increase, the digital sound becomes closer to the original analog waveform.
- This improves the sound quality, but also increases the amount of data.

3 Sampling Theorem

- If the sampling frequency is twice the highest frequency of the original analog waveform, then the waveform of the original analog signal can be accurately reconstructed from the digitized data.

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3 Amount of Sound Data

1 Channels

- They are the number of signals used when transmitting sound.
- A method of playback using a single signal is called monaural **(mono)**.
- A method of playback using two different signals is called **stereo**.

2 Calculation of Audio Data Amount

- The data amount (in bits per second) is calculated using the following formula:
- **Data amount [bits/sec]** =

  Sampling frequency × Quantization bit depth × Number of channels

أهم الكلمات والمصطلحات			
Digitalization	التحويل الرقمي	Quantization	التكميم
Channel	قناة صوتية	Bit depth	عمق البت
Amount of sound data	كمية بيانات الصوت	Quantization bit depth	عمق بت التكميم
Vibration of air	اهتزاز الهواء	Encoding	الترميز
Propagate	ينتشر	Sampling theorem	نظرية أخذ العينات
Pulse Code Modulation (PCM)	تعديل الشفرة النبضية	Monaural (Mono)	صوت أحادي
Sampling	أخذ العينات	Stereo	صوت إستريو

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Lesson 7 Exercises

1 Choose the correct answer:

1 Sound is transmitted through the ..... .
a. vibration of air b. light c. metal d. glass

2 Natural sound waves are called ..... data.
a. binary b. analog c. coded d. processed

3 The process of converting analog sound into digital form is called ..... .
a. digitization b. quantization
c. encoding d. decoding

4 The unit of frequency is ..... .
a. volt b. hertz c. byte d. bit

5 The time for one wave to propagate is called the ..... .
a. amplitude b. period c. level d. speed

6 Pulse code modulation (PCM) is used for ..... .
a. encoding pictures b. digitizing audio data
c. amplifying sound d. recording video

7 Sampling measures the ..... of the waveform at regular intervals.
a. color b. height c. time d. sound type

8 The number of samples taken per second is called ..... .
a. sampling frequency b. sampling period
c. bit rate d. amplitude

9 Quantization converts measured values into ..... levels.
a. equal b. uneven c. random d. irregular

10 Quantization bit depth determines the number of ..... in quantization.
a. waves b. bits c. levels d. frequencies

11 Encoding expresses the quantized values in ..... forms.
a. analog b. binary c. graphic d. decimal

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12 Increasing sampling frequency and bit depth improves the sound quality but also ..... .

a. decreases the volume
b. increases the data
c. reduces the noise
d. changes the tone

13 Monaural playback uses ..... signal(s).

a. one
b. two
c. three
d. four

14 The amount of sound data per second is calculated by multiplying ..... .

a. frequency × voltage
b. sampling frequency × bit depth × channels
c. amplitude × time
d. hertz × volume

2 Put (✓) or (✗):

1 Sound is transmitted through the vibration of air. ( )
2 Analog data is stored in binary form. ( )
3 Frequency is measured in hertz. ( )
4 The period refers to the number of waves per second. ( )
5 PCM stands for Pulse Code Modulation. ( )
6 Sampling means measuring the height of the waveform at random times. ( )
7 Sampling frequency means how many samples are taken per second. ( )
8 Quantization changes the height values into the nearest fixed levels. ( )
9 The bit depth determines how many levels are used in quantization. ( )
10 Encoding converts binary data into sound waves. ( )
11 Higher sampling frequency improves sound quality but increases data size. ( )
12 The sampling theorem states that sampling frequency should be twice the highest signal frequency. ( )
13 Monaural playback uses two channels. ( )
14 Stereo playback uses two different signals. ( )

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Lesson 8 Digitization of Images

1 What Is Digitization of Images?

- A digital image is composed of pixels, which are the smallest units of an image.
- Digitization involves converting visual information into digital data that can be processed by computers.

1 Pixel

- A pixel is the smallest unit that composes an image.
- A digital image is represented by an arrangement of pixels.

2 Procedure for Digitization of Images

- Images captured by digital cameras or image scanners are digitized and imported into a computer through the following steps:

1 Sampling

- The image is divided into pixels.
- The representative brightness of each pixel is extracted.
- Resolution: This refers to the fineness of pixels during sampling.
- The unit of resolution is dpi
- Sometimes expressed as vertical pixels × horizontal pixels.

2 Quantization

- It converts the brightness of each pixel into numerical values.
- These values are divided into several levels.

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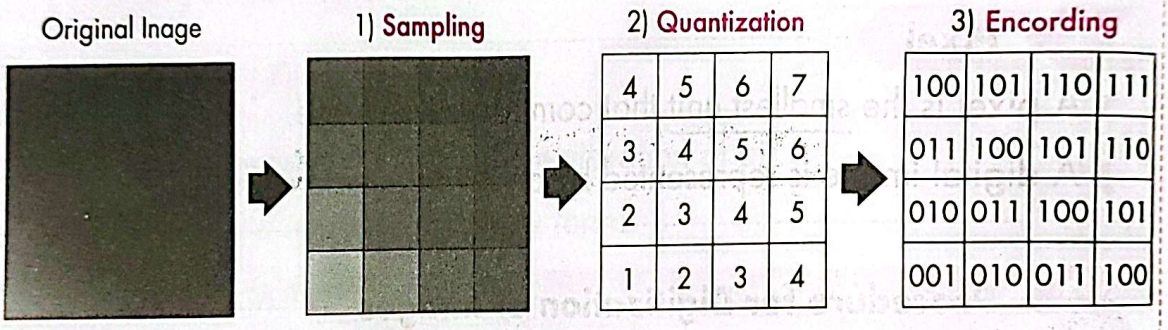
- **Gradation:** It is the level value that represents the intensity of color per pixel.
- The gradation is determined by the number of bits allocated to each pixel.

EX

- At 256 gradients (8 bits), it represents 256 levels from 0 to 255.

3 Encoding:

- It is expressing quantized values in binary numbers (0 and 1).



3 Digitization and Data Volume

Data Amount of an Image (in bits)

Formula:

Number of pixels (vertical × horizontal) × Number of bits for color information

Effect of Resolution and Gradation

- The **higher** the values of resolution and gradation:
  - ✓ The smoother the image.
  - ✓ The better the image quality.
  - ✓ But the amount of data increases.

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4 Raster Format vs Vector Format

1 Raster Format:

- It uses an arrangement of pixels to represent text or shapes.
- It appears jagged when enlarged; this is called **jaggies**.
- Images are drawn using painting software.

2 Vector Format:

- It represents images using coordinates of points, angles, and line thickness.
- Images are drawn using drawing software.

2 Color Representation

1 Three Primary Colors of Light

- They are: Red, Green, and Blue.
- When these colors of light are mixed, the brightness increases and approaches **white**.

2 Three Primary Colors of Pigment

- They are: Cyan, Magenta, and Yellow.
- Mixing these colors will darken them and bring them closer to **black**.

3 Additive Color Mixing

- It is a method of representing colors by combining the three primary colors of light.
- Used in: ❶ Televisions ❷ Computers displays

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4 Subtractive Color Mixing

- It is a method of representing colors by combining the three primary colors of pigment.
- Used in: Color printers

5 24-bit Full Color

- Each color of (Red, Green, Blue) is represented in 256 levels.
- 8 bits × 3 colors = 24 bits

أهم الكلمات والمصطلحات

Pixel	بكسل	Vector format	تنسيق متجهي
Sampling	أخذ العينات	Jaggies	التعرج
Resolution	الدقة	Painting software	برنامج الرسم
Dpi	نقطة لكل بوصة	Drawing software	برنامج التصميم
Quantization	التكميم	Three primary colors of light	الألوان الأساسية للضوء
Gradation	التدرج	Three primary colors of pigment	الألوان الأساسية للصبغة
Encoding	الترميز	Additive color mixing	المزج اللوني الإضافي
Binary numbers	الأرقام الثنائية	Subtractive color mixing	المزج اللوني الطرحي
Data volume	حجم البيانات	24-bit full color	الألوان الكاملة ٤٢ بت
Raster format	تنسيق نقطي		

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Lesson 8 Exercises

1 Choose the correct answer:

1 A pixel is ..... .

a. software
b. a color
c. the smallest unit of an image
d. a scanner

2 A digital image is composed of ..... .

a. vectors b. pixels c. colors d. shapes

3 Sampling divides the image into ..... .

a. colors b. pixels c. gradients d. formats

4 The resolution is measured in ..... .

a. bits b. pixels c. Dpi d. bytes

5 Quantization converts brightness into ..... .

a. colors
b. pixels
c. numerical values
d. formats

6 Gradation represents the ..... of color per pixel.

a. shape b. intensity c. format d. size

7 Encoding expresses values in ..... .

a. decimal b. binary c. hexadecimal d. text

8 Higher resolution and gradation leads to ..... .

a. lower quality
b. a smoother image
c. less data
d. smaller pixels

9 Raster format uses ..... to represent shapes.

a. coordinates b. pixels c. angles d. lines

10 Vector format includes ..... .

a. pixels
b. gradation
c. coordinates and angles
d. compression

11 Jaggies appear when raster images are ..... .

a. compressed b. enlarged c. colored d. printed

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12 Painting software is used for ..... .
a. vector format b. raster format
c. encoding d. sampling

13 Drawing software is used for ..... .
a. raster format b. gradation c. vector format d. quantization

14 Additive color mixing uses ..... .
a. pigment colors b. light colors
c. black and white d. cyan and yellow

15 24-bit full color represents each color in ..... levels.
a. 128 b. 512 c. 256 d. 1,024

2 Put (✓) or (✗):

1 A pixel is the largest unit of an image. ( )
2 Sampling extracts brightness from each pixel. ( )
3 Resolution is expressed only in bits. ( )
4 Quantization assigns numerical values to brightness. ( )
5 Gradation depends on the number of bits per pixel. ( )
6 Encoding uses decimal numbers. ( )
7 Higher resolution increases the image quality. ( )
8 Raster format appears smooth when enlarged. ( )
9 Vector format uses coordinates and line thickness. ( )
10 Jaggies are smooth edges in vector images. ( )
11 Painting software is used for raster images. ( )
12 Drawing software is used for vector images. ( )
13 Additive color mixing is used in printers. ( )
14 Subtractive color mixing is used in displays. ( )
15 24-bit full color uses 8 bits for each primary color. ( )

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Lesson 9 Digital Representation and Compression Technology for Videos

1 Mechanism of Videos

- A video is an electronic medium that creates the illusion of movement by displaying a series of still images in rapid succession. This effect relies on the afterimage phenomenon, a characteristic of human vision.

1 Key Concepts

- **Video:** It creates the illusion of movement by displaying a sequence of still images shown rapidly to simulate motion.
  - **Afterimage phenomenon:** The human eye retains an image briefly, allowing smooth transitions between frames.
- **Frame:** It is each still image in a video.
- **Frame rate:** It is the number of frames displayed per second. It is measured in fps (frames per second).
  - A higher frame rate results in a smoother video but also larger data size.

2 Calculating Video Data Volume

- To calculate the amount of video data, use the formula:
- **Amount of video data =**
  Amount of image data [B] × Frame rate [fps] × Time [seconds]

2 Data Compression

1 Compression

- **Compression:** It means reducing the amount of data while preserving its content.

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2 Decompression

- It means restoring compressed data to its original state.

3 Compression Ratio

- Compression ratio [%] =
  (Amount of data after compression × 100) ÷ Original amount of data

4 Types of Compression

- Lossless Compression:
  - It allows complete restoration of original data.
  - It is used for text and program data.
- Lossy Compression:
  - Original data cannot be fully restored.
  - It is used for audio, images, and video.
  - It is designed so that humans do not perceive the loss in quality.

3 Main Types of Lossless Compression

1 Run-Length Encoding

- It replaces repeated symbols with a count.
- It is effective for consecutive identical symbols.

EX

Before: "AAAAABBAAAABBBBBBBBAAAAAA" (25 characters)

AAAAA	BB	AAAA	BBBBBBBB	AAAAAA
5 of "A"	2 of "B"	4 of "A"	8 of "B"	6 of "A"

After: "A5B2A4B8A6" (10 characters)

Compression ratio = (10 ÷ 25) × 100 = 40%

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2 Huffman Coding

- It assigns shorter bit sequences to frequent characters.
- It assigns longer bit sequences to less frequent characters.

أهم الكلمات والمصطلحات			
Video	فيديو	Lossless compression	ضغط بدون فقدان البيانات
Afterimage phenomenon	ظاهرة الصورة اللاحقة	Lossy compression	ضغط مع فقدان البيانات
Frame	إطار	Run-length encoding	ترميز طول السلسلة
Frame rate	معدل الإطارات	Huffman coding	ترميز هوفمان
fps	إطار في الثانية	Data volume	حجم البيانات
Compression	ضغط البيانات	Image data	بيانات الصورة
Decompression	فك الضغط	Binary sequence	تسلسل ثنائي
Compression ratio	نسبة الضغط		

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Lesson 9 Exercises

1 Choose the correct answer:

1. A video creates movement by ..... .
   a. using sound
   b. displaying still images
   c. compressing data
   d. using binary data

2. The illusion of movement in videos is due to ..... .
   a. frame rate
   b. Huffman coding
   c. afterimage phenomenon
   d. compression

3. Each still image in a video is called a ..... .
   a. pixel
   b. frame
   c. byte
   d. code

4. Frame rate is measured in ..... .
   a. Hz
   b. dpi
   c. fps
   d. bits

5. A higher frame rate results in ..... .
   a. a slower video
   b. a smoother video
   c. smaller data
   d. lower quality

6. The formula for video data is: ..... .
   a. Image data × time
   b. Frame rate × Time
   c. Image data × Frame rate × Time
   d. None of them

7. Compression reduces the ..... .
   a. quality
   b. data size
   c. frame rate
   d. color

8. Decompression restores data to ..... .
   a. binary
   b. its compressed form
   c. its original state
   d. frame format

9. Compression ratio is calculated using ..... .
   a. the frame rate
   b. the image size
   c. data before and after compression
   d. the time

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10 Lossless compression allows ..... .

a. partial restoration b. no restoration
c. full restoration d. none of them

11 Lossy compression is used for ..... .

a. texts b. programs c. videos d. passwords

12 Run-length encoding replaces ..... .

a. symbols b. frames
c. repeated symbols d. colors

13 Huffman coding assigns shorter bits to ..... .

a. rare characters b. frequent characters
c. frames d. pixels

14 The compression ratio of "A5B2A4B8A6" from 25 characters is ..... .

a. 25% b. 40% c. 60% d. 10%

15 Huffman coding is based on ..... .

a. frame rate b. color depth
c. character frequency d. image resolution

2 Put (✓) or (✗):

1 A video is made of moving images. ( )
2 The afterimage phenomenon helps create motion illusion. ( )
3 Frame rate is the number of pixels per second. ( )
4 A higher frame rate increases the data size. ( )
5 Compression increases the amount of data. ( )
6 Decompression restores the compressed data. ( )
7 Lossless compression cannot restore original data. ( )
8 Lossy compression is used for video files. ( )
9 Run-length encoding is effective for repeated symbols. ( )
10 Huffman coding uses equal bit lengths for all characters. ( )
11 The formula for video data includes frame rate and time. ( )
12 Compression ratio compares data before and after compression. ( )
13 Lossy compression is used for text files. ( )
14 Huffman coding assigns longer bits to frequent characters. ( )
15 Run-length encoding reduces 25 characters to 10 in the example. ( )

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Lesson 10 Information Design

1 Information Design

Information Design

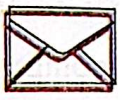
It is the process of organizing and creatively expressing information according to its purpose, ensuring that the intended message is correctly conveyed to the target audience.

Information Design Methods

1 Abstraction

- It conveys the intended information from a large amount of data.
- Pictogram:
  - A pictorial symbol is used to convey information without using words.
  - It is commonly used for information signs at stations and airports.

- Icon:
  - It is a visual representation of a program's content.
  - It is used on computers and smartphones as images or illustrations.



2 Visualization

- It is representing information visually to make it easier to understand.

EX

1. Tables
2. Graphs

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3 Structuring

» It means organizing and expressing information clearly by arranging it based on:

- Relationships
- Connections
- Levels
- Stages
- Order

EX 1 Hierarchical menus on web pages 2 Department store floor maps

2 Design Techniques for Ease of Understanding

1 User Interface (UI)

» It's a system for transferring information between humans and devices.

EX 1 Voice input 2 Touch panel 3 Keyboard

» **CUI:** It is a user interface where a device is operated by entering commands.

» **GUI:** It is a user interface that allows users to issue commands in an intuitive and easy-to-understand way using **icons** and **buttons**.

2 User Experience (UX)

» It is the experience or emotional impact that users gain from interacting with a product or a service.

3 Affordance

» It refers to actions or operations that can be performed on an object.

4 Signifier

» It cues that prompt users to take action.

5 Usability

» It's a measure of how easy and understandable a product is for users.

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6 Accessibility

» It is the ease of access to information and services for all people.

7 Universal Design

» It is an inclusive design that allows everyone to use it regardless of their:

- Age
- Language
- Nationality
- Physical ability

3 Organizing and Classifying Information

LATCH Method

» It is a principle for organizing information and presenting it in a way that is easy for users to understand.

» Information is organized and classified according to five criteria:

Criterion	Description
Location	Based on the physical location
Alphabet	Based on the alphabetical or syllabary order
Time	Based on the sequence of events
Category	Based on the differences between things
Hierarchy	Based on the quantitative changes (size, level, ...)

أهم الكلمات والمصطلحات

GUI	واجهة المستخدم الرسومية	User experience (UX)	تجربة المستخدم
Abstraction	التجريد	Affordance	قابلية الاستخدام
Pictogram	رمز تصويري	Signifier	مؤشر العمل
Department store floor map	خريطة طوابق المتجر	Usability	سهولة الاستخدام
Visualization	التصوير البياني	Accessibility	سهولة الوصول
Structuring	الهيكلة	Universal design	التصميم الشامل
User interface (UI)	واجهة المستخدم	LATCH method	طريقة LATCH
CUI	واجهة المستخدم النصية	Hierarchical menu	قائمة هرمية

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Lesson 10 Exercises

1 Choose the correct answer:

1 Information design is the process of ..... .
- a. programming
- b. organizing and expressing information
- c. drawing
- d. encrypting data

2 Abstraction helps convey ..... .
- a. complex codes
- b. simple information from large data
- c. sounds
- d. icons

3 A pictogram is used to ..... .
- a. represent programs
- b. convey information without words
- c. store data
- d. encrypt files

4 Icons are used to represent ..... .
- a. text
- b. programs
- c. sound
- d. passwords

5 Visualization makes information ..... .
- a. hidden
- b. complex
- c. understandable
- d. encrypted

6 Structuring organizes information based on their ..... .
- a. random order
- b. relationships and levels
- c. passwords
- d. icons

7 UI stands for ..... .
- a. User Interface
- b. Unique Input
- c. Universal Icon
- d. Usability Index

8 CUI is operated by ..... .
- a. touch panel
- b. voice
- c. keyboard commands
- d. icons

9 GUI allows users to interact using ..... .
- a. text only
- b. icons and buttons
- c. voice
- d. passwords

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10 UX refers to ..... .
a. user's emotional experience b. encryption
c. interface d. data storage

11 Affordance means ..... .
a. cost of design b. actions possible on an object
c. password strength d. data size

12 Signifiers are ..... .
a. cues for user action b. passwords
c. icons d. data types

13 Usability measures the ..... .
a. security b. accessibility
c. ease of use d. encryption

14 Universal design is intended for ..... .
a. experts only b. all people c. designers d. developers

15 The LATCH method includes classification by ..... .
a. alphabets b. time c. category d. all of them

2 Put (✓) or (✗):

1 Information design helps convey messages clearly. ( )
2 Pictograms use words to express meaning. ( )
3 Icons are used on smartphones and computers. ( )
4 Visualization makes data harder to understand. ( )
5 Structuring ignores relationships between data. ( )
6 UI is a system for human-device interaction. ( )
7 CUI uses graphical buttons. ( )
8 GUI is easier to use than CUI. ( )
9 UX refers to the user's emotional experience. ( )
10 Affordance means the object cannot be used. ( )
11 Signifiers guide users to take action. ( )
12 Usability measures how secure a system is. ( )
13 Accessibility is only for people with disabilities. ( )
14 Universal design excludes older users. ( )
15 LATCH includes classification by location and hierarchy. ( )

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Model Exams on Chapter 6

Model Exam 1

1 Choose the correct answer:

1 The basic unit of information is ..... .

a. 1 megabyte b. 1 kilobyte c. 1 byte d. 1 bit

2 To represent only two states, ON and OFF, the ..... number system is used.

a. decimal b. octal c. binary d. hexadecimal

3 When converting the hexadecimal number $A4_{(16)}$ to binary, the result is ..... .

a. $10011010_{(2)}$ b. $10100100_{(2)}$

c. $11001001_{(2)}$ d. $11100011_{(2)}$

4 Which of the following is an example of digital character encoding?

a. ASCII b. Sans-serif

c. Semi-cursive d. Font

5 If Jana adds the binary numbers $1010_{(2)} + 110_{(2)}$, the correct sum is ..... .

a. $10100_{(2)}$ b. $10000_{(2)}$ c. $1111_{(2)}$ d. $1100_{(2)}$

6 Which of the following correctly represents the relationship between storage units?

a. 1 MB < 1 KB < 1 GB b. 1 TB < 1 GB < 1 MB

c. 1 KB < 1 MB < 1 GB < 1 TB d. 1 GB < 1 MB < 1 KB

7 In digitizing an image, dividing the image into a grid of pixels is called ..... .

a. encoding b. quantization

c. filtering d. sampling

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2 Put (T) or (F):

1. Vector images lose quality when scaled up. ( )
2. 🕮 The font is the shape data of characters corresponding to character symbols. ( )
3. Binary numbers use the digits 0–9 to represent information. ( )
4. 🕮 The unicode standard was designed to collect character symbols from different world languages into one system. ( )
5. 🕮 1 byte equals 8 bits and can represent 256 different probabilities. ( )
6. 1 Tbyte equals 1,024 Mbytes. ( )
7. Complements are used in computers to represent negative numbers. ( )
8. A digital image is formed by the arrangement of pixels. ( )

Model Exam 2

1 Choose the correct answer:

1. 🕮 The number of possible probabilities to represent 3 bits is ..... .
   a. 2 b. 4 c. 8 d. 16
2. The method of representing numbers using only "0" and "1" is called ..... .
   a. decimal b. binary c. octal d. hexadecimal
3. 🕮 When converting the binary number $1011_{(2)}$ to decimal, the result is ..... .
   a. 10 b. 11 c. 12 d. 13
4. 🕮 One of the causes of character corruption is the ..... .
   a. weak processor speed
   b. low storage capacity
   c. different font types
   d. mismatch between encoding and decoding methods

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5 ..... is a digital character encoding system.
a. Sans-serif b. Semi-cursive
c. ASCII d. Font

6 ..... in image digitization converts the brightness of each pixel into numbers.
a. Quantization b. Sampling c. Encoding d. Compression

7 A method of representing numbers using the digits 0 – 9 and the letters A – F is called ..... .
a. binary b. decimal c. hexadecimal d. octal

8 The opposite process of encoding is called ..... .
a. decoding b. encrypting c. processing d. coding

2 Put (T) or (F):

1 1 byte consists of 8 bits. ( )
2 📖 Encoding is the process of converting digital data into readable characters. ( )
3 📖 The hexadecimal system uses numbers from 0 to 9 and letters from A to F. ( )
4 Sampling and quantization are essential steps in digitizing images. ( )
5 📖 When converting from binary to hexadecimal, the binary number is divided into groups of 8 bits. ( )
6 User experience (UX) refers to the experience or emotional impact that users gain from interacting with a product or a service. ( )
7 UTF-8 and UTF-16 are forms of ASCII encoding. ( )

Model Exam 3

1 Choose the correct answer:

1 1 byte consists of ..... bits.
a. 4 b. 6 c. 12 d. 8

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2 A method of representing numbers using ten digits from "0" to "9" is called ..... .

a. binary b. octal c. decimal d. hexadecimal

3 The number of different pieces of information that can be represented by n bits is ..... .

a. n b. 2^n c. n^2 d. 2n

4 📖 The letter "H" in the string "Hello" is represented in the hexadecimal system by the symbol ..... .

a. 6C b. 65 c. 48 d. 6F

5 📖 The binary number $10011010_{(2)}$ is equivalent to ..... in the hexadecimal system.

a. $9A_{(16)}$ b. $A9_{(16)}$ c. $19_{(16)}$ d. $91_{(16)}$

6 📖 Which of the following elements are necessary to display characters on a computer screen?

a. Font only b. Encoding only

c. Encoding + Font d. Hexadecimal system

7 When $1101_{(2)}$ is subtracted from $1110_{(2)}$, the result is ..... .

a. 0 b. $10_{(2)}$ c. $11_{(2)}$ d. $1_{(2)}$

2 Put (T) or (F):

1 1 KB equals 1024 bytes. ( )

2 📖 A bit can represent more than two states at the same time. ( )

3 Hexadecimal numbers use digits the 0–9 and the letters A–F. ( )

4 A raster image is made up of pixels. ( )

5 📖 ASCII code supports all languages, including Arabic. ( )

6 Using graphs, charts, and infographics can improve data communication. ( )

7 Fonts define the visual shape of characters corresponding to codes. ( )

8 Decoding means interpreting a character code into its corresponding character. ( )

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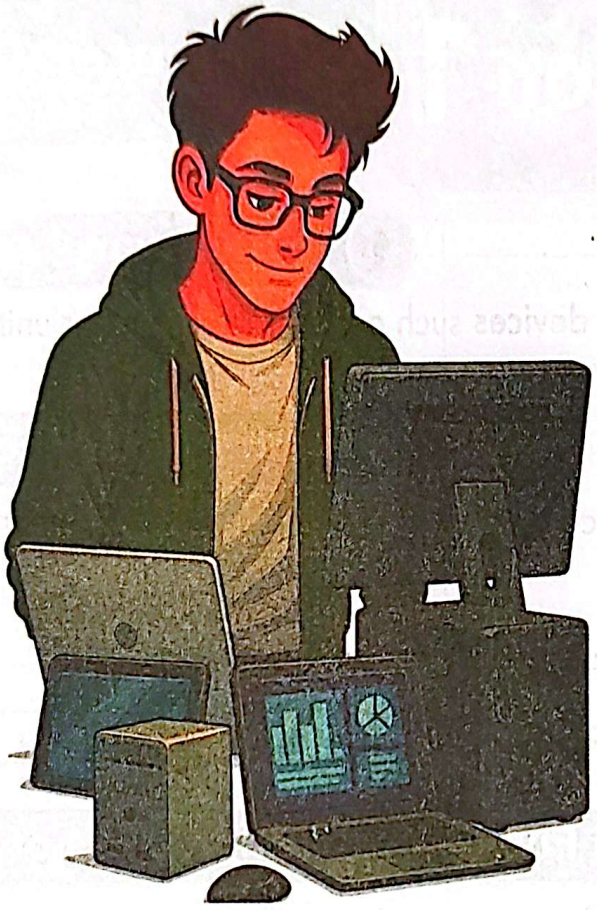
Chapter

7

Computers



Chapter Lessons:

Lesson 1 Computer Configuration

Lesson 2 Computer Software

Lesson 3 Logic Circuits

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Lesson 1 Computer Configuration

1 Hardware

» Refers to **devices** such as the main computer unit and peripheral devices.

2 Peripheral Devices

» Devices connected to a computer to perform input/output tasks.

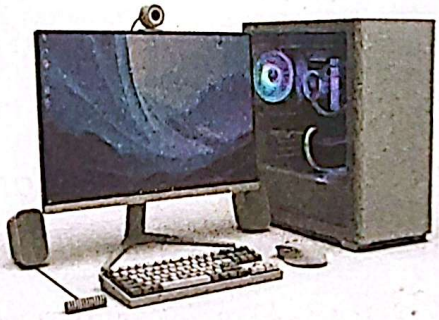
EX

1. keyboard
2. mouse
3. display
4. printer

3 The Five Major Components of a Computer

» A computer consists of the following **five** components:

1. The control unit
2. The arithmetic unit
3. The memory unit
4. The input unit
5. The output unit



» The **control unit** and **arithmetic unit** together are referred to as the **CPU** (central processing unit)

» **Storage devices** are divided into:

1. **Main memory:** which temporarily stores programs and data.
2. **Secondary memory:** which is used for long-term storage.

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Roles of the Five Major Components of a Computer

Five major components		Role	Example
❶ Control unit	CPU	Executes **instructions** and issues **commands** to each function.	• CPU
❷ Arithmetic unit		Performs **calculations**.	
❸ Storage device	Main memory device (Memory)	Temporarily stores programs and data.	• Main memory (RAM)
	Secondary memory (Storage)	Used for long-term storage.	• Hard disk, SSD, USB memory
❹ Input device		Inputs information from external sources.	• Keyboard, mouse • Scanner
❺ Output device		Outputs information outside of the computer.	• Display • Printer

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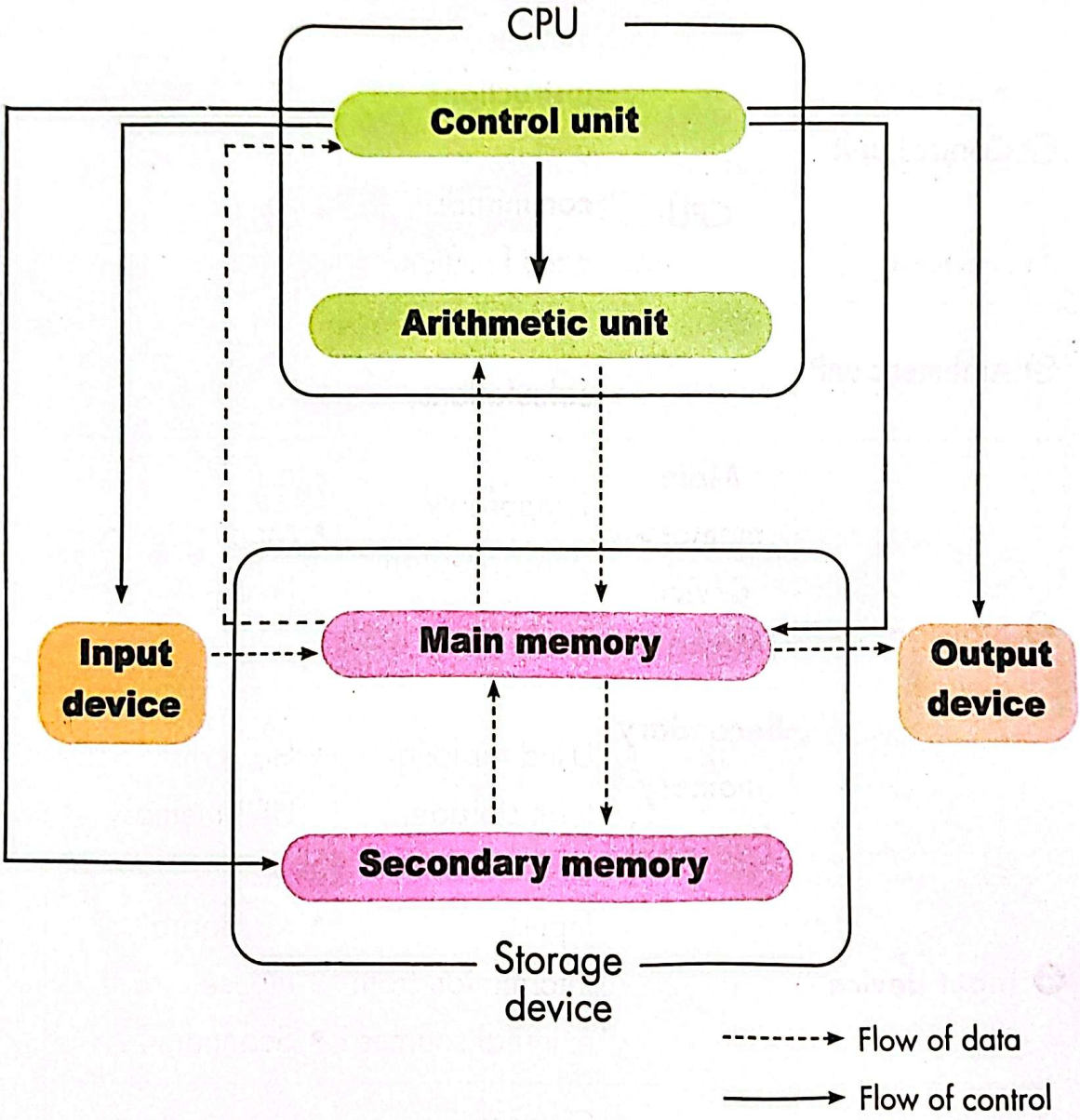
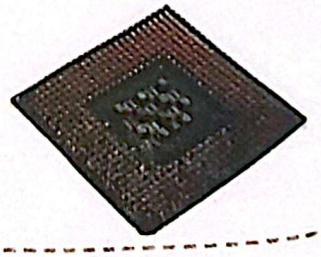
4 Relationship of the Five Major Components of a Computer



NOTES:

- Control unit **manages the flow of control.**



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5 Interfaces

Interface

- A component that mediates the exchange of information.
- It is used for connecting the main computer and peripheral devices.

Types of Interfaces:

Interface	Description	Compatible Devices
1 USB	The most widely used interface for peripheral devices.	• Printers • Keyboards • External hard drives
2 HDMI	Transmits video, audio, and other data through a single cable.	• Digital TVs • Audio equipment
3 Ethernet	Used in wired LANs at home, the office.	• Hubs • Routers

أهم الكلمات والمصطلحات

Peripheral devices	الأجهزة الطرفية	Instructions	التعليمات
Control unit	وحدة التحكم	Commands	الأوامر
Arithmetic unit	وحدة الحساب	Calculations	العمليات الحسابية
Memory unit	وحدة الذاكرة	CPU	وحدة المعالجة المركزي
Input unit	وحدة الإدخال	Mediate	يتوسط
Output unit	وحدة الإخراج	Main memory	الذاكرة الرئيسية

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Lesson 1 Exercise

1 Choose the correct answer:

1. The CPU is composed of ..... .
   a. Memory and storage
   b. Input and output units
   c. Control and arithmetic units
   d. Interface and HDMI

2. ..... stores programs and data temporarily.
   a. Secondary memory
   b. USB
   c. Main memory
   d. HDMI

3. Which of the following is NOT a peripheral device?
   a. Printer
   b. Keyboard
   c. CPU
   d. Mouse

4. ..... performs calculations in a computer.
   a. Control unit
   b. Arithmetic unit
   c. Output unit
   d. Interface

5. ..... is used for long-term storage.
   a. RAM
   b. Main memory
   c. Secondary memory
   d. CPU

6. The flow of control in a computer is managed by the ..... .
   a. Output unit
   b. Arithmetic unit
   c. Control unit
   d. Interface

7. ..... is a communication standard used in wired LANs.
   a. HDMI
   b. USB
   c. Ethernet
   d. SSD

8. Which of the following is an input device?
   a. Display
   b. Printer
   c. Scanner
   d. SSD

9. ..... is the most widely used interface for peripheral.
   a. HDMI
   b. Ethernet
   c. USB
   d. CPU

10. ..... transmits video and audio through a single cable.
    a. USB
    b. HDMI
    c. Ethernet
    d. SSD

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11 ..... outputs information outside the computer.

a. Input unit b. Output unit c. Memory unit d. Control unit

12 Which of the following is NOT part of the five major components of a computer?

a. Interface b. Control unit

c. Arithmetic unit d. Output unit

13 ..... mediates the exchange of information between devices.

a. CPU b. Interface c. HDMI d. USB

14 A hard disk is an example of ..... .

a. Input device b. Output device

c. Secondary memory d. Main memory

15 The ..... stores programs and data temporarily.

a. SSD b. USB c. Main memory d. HDMI

2 Put (✓) or (✗):

1 The CPU includes the control unit and arithmetic unit. ( )

2 HDMI is used to connect keyboards and printers. ( )

3 Secondary memory is used for temporary storage. ( )

4 USB is the most common interface for peripheral devices. ( )

5 The output unit receives data from external sources. ( )

6 Ethernet is used in wired LANs. ( )

7 The memory unit includes both main and secondary memory. ( )

8 The control unit performs calculations. ( )

9 Display and printer are examples of output devices. ( )

10 The input unit outputs information outside the computer. ( )

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Lesson 2 Computer Software

Computer System

- Hardware
- Software

1 Hardware

» Refers to physical devices such as the main computer unit and peripheral devices.

EX ① CPU ② Memory ③ Storage

2 Software

» Refers to programs and data that operate on hardware.

Types of Software

① **System software:** the software necessary for operating the hardware.

② **Operating System (OS):**

» A type of system software responsible for the basic functions of a computer.

» It has management functions such as:

① Task management ② Memory management

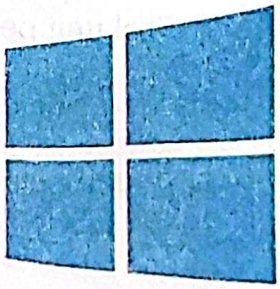
③ File management

EX

① Windows

② macOS

③ Android OS



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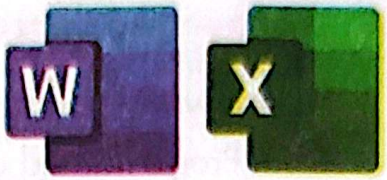
3 Application Software

» Software that operates on top of system software.

EX 1 Word processing software

2 Spreadsheet software



3 Device Driver

» A program that controls communication between a connected device and software on a computer.

» Also known simply as a "driver."

أهم الكلمات والمصطلحات			
Hardware	الأجهزة المادية	Memory management	إدارة الذاكرة
Peripheral devices	الأجهزة الطرفية	File management	إدارة الملفات
CPU	وحدة المعالجة المركزية	Application software	البرمجيات التطبيقية
Storage	التخزين	Spreadsheet software	برنامج الجداول الإلكترونية
Software	البرمجيات	Device driver	برنامج التشغيل
System software	البرمجيات النظامية	Task management	إدارة المهام

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Lesson 2 Exercise

1 Choose the correct answer:

1 Hardware includes ..... .

a. Programs and data
b. CPU and memory
c. Operating systems
d. Word processors

2 Software refers to ..... .

a. Physical devices
b. Storage units
c. Programs and data
d. Peripheral devices

3 ..... is necessary for operating the hardware.

a. Application software
b. System software
c. Device driver
d. CPU

4 The operating system is a type of ..... .

a. Application software
b. Peripheral device
c. System software
d. Storage

5 ..... manages tasks, memory, and files.

a. CPU
b. Device driver
c. Operating system
d. Spreadsheet

6 Which of the following is NOT an operating system?

a. Windows
b. macOS
c. Android OS
d. Word processor

7 Application software operates ..... .

a. independently
b. on top of system software
c. without hardware
d. inside the CPU

8 Word processing software is an example of ..... .

a. system software
b. application software
c. device driver
d. operating system

9 ..... controls communication between a device and software.

a. CPU
b. Application software
c. Device driver
d. Operating system

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10 A driver is also known as a ..... .

a. spreadsheet b. program c. peripheral d. device

11 Which of the following is NOT hardware?

a. CPU b. Memory c. Storage d. Android OS

12 ..... is responsible for basic computer functions.

a. Application software b. Operating system
c. Device driver d. Spreadsheet

13 Spreadsheet software is a type of ..... .

a. System software b. Hardware
c. Application software d. Driver

14 ..... is used to manage files and memory.

a. CPU b. Operating system
c. Word processor d. USB

15 The main computer unit is part of ..... .

a. Software b. Application software
c. Hardware d. Driver

2 Put (✓) or (✗):

1 Hardware includes programs and data. ( )

2 The operating system is a type of system software. ( )

3 Application software operates independently of system software. ( )

4 A device driver manages communication between hardware and software. ( )

5 Word processing software is a type of system software. ( )

6 CPU and memory are examples of hardware. ( )

7 Android OS is an example of application software. ( )

8 File management is a function of the operating system. ( )

9 A driver is a type of hardware. ( )

10 Spreadsheet software runs on top of system software. ( )

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Lesson 3 Logic Circuits

1 Logic Circuits

1 Logical Operations

- Operations performed using combinations of the numbers 0 and 1.
- In computers:
  - "1" is processed as true.
  - "0" is processed as false.

2 Logic Circuit

- A circuit designed to perform logical operations.

EX ① AND ② OR ③ NOT

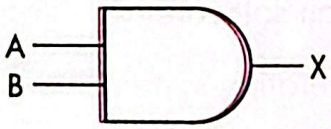
3 Truth Table

- A table that shows all possible combinations of inputs and outputs for a logic circuit.

2 Basic Logic Gates

1 AND Gate (Logical Conjunction Circuit)

- Outputs 1 only when all inputs are 1.



Truth Table

Input A	Input B	Output X
0	0	0
0	1	0
1	0	0
1	1	1

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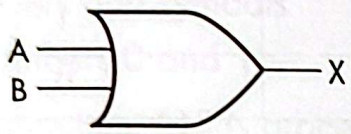
2 OR Gate (Logical Disjunction Circuit)

» Outputs 1 if at least one of the inputs is 1.

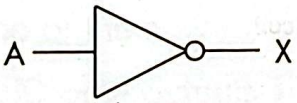


Truth Table

Input A	Input B	Output X
0	0	0
0	1	1
1	0	1
1	1	1

3 NOT Circuit (Inverter Circuit)

» Outputs the opposite result of the input.



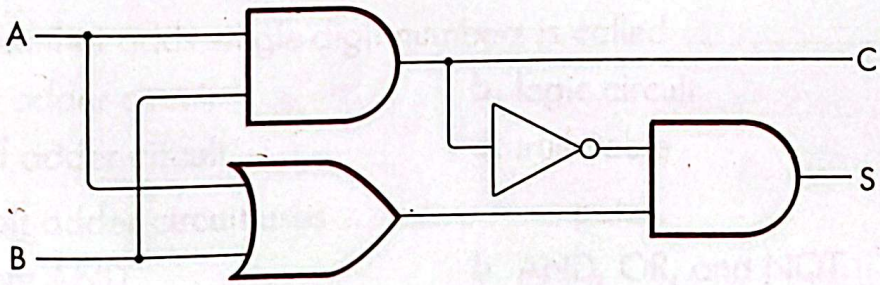
Truth Table

Input A	Output X
0	1
1	0

3 Adder Circuits

1 Half Adder Circuit

» It represents the addition of single-digit numbers composed of AND, OR, and NOT gates.



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Truth Table

Input A	Input B	Output C (Carry)	Output S (Sum)
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

2 Full Adder Circuit

» A circuit that considers carry from the lower bit and carry to the higher bit.

أهم الكلمات والمصطلحات			
Logical operations	العمليات المنطقية	Full adder circuit	دائرة الجمع الكاملة
Logic circuit	الدائرة المنطقية	Single-digit numbers	أرقام فردية
Truth table	جدول الحقيقة	Logical conjunction	الاقتران المنطقي
Inverter circuit	دائرة العاكس	Logical disjunction	الانفصال المنطقي
Half adder circuit	دائرة الجمع النصفية		

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Lesson 3 Exercise

1 Choose the correct answer:

1. Logical operations use ..... .
   a. letters and symbols
   b. numbers 2 and 3
   c. numbers 0 and 1
   d. all of them
2. In computers, "1" is processed as ..... .
   a. False
   b. True
   c. Zero
   d. Input
3. A logic circuit is designed to perform ..... .
   a. arithmetic operations
   b. logical operations
   c. output functions
   d. none of them
4. A truth table shows ..... .
   a. only outputs
   b. only inputs
   c. all combinations of inputs and outputs
   d. none of them
5. The AND gate outputs 1 only when ..... .
   a. all inputs are 0
   b. at least one input is 1
   c. all inputs are 1
   d. inputs are different
6. The OR gate outputs 1 if ..... .
   a. all inputs are 0
   b. at least one input is 1
   c. inputs are equal
   d. output is 0
7. The NOT circuit outputs ..... .
   a. the same as input
   b. the opposite of input
   c. zero always
   d. one always
8. A circuit that adds single-digit numbers is called ..... .
   a. full adder circuit
   b. logic circuit
   c. half adder circuit
   d. truth table
9. The half adder circuit uses ..... gates.
   a. Only AND
   b. AND, OR, and NOT
   c. Only OR
   d. Only NOT

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10 The full adder circuit considers ..... .

a. Only input
b. Only output
c. Carry from lower and to higher bit
d. Truth table

11 Which of the following is NOT a logic gate?

a. AND b. OR c. NOT d. CPU

12 The output of a NOT gate for input 0 is ..... .

a. 0 b. 1 c. 2 d. None

13 The truth table is used to show ..... .

a. Circuit design b. Input/output combinations
c. Software functions d. None of them

14 The output of an OR gate for inputs 1 and 0 is ..... .

a. 0 b. 1 c. 2 d. None

15 The sum output in a half adder for inputs 1 and 1 is ..... .

a. 0 b. 1 c. 2 d. None

2 Put (✓) or (✗):

1 Logical operations use numbers 0 and 1. ( )
2 A logic circuit performs arithmetic operations. ( )
3 The AND gate outputs 1 only when all inputs are 1. ( )
4 The OR gate outputs 1 only when all inputs are 1. ( )
5 The NOT circuit outputs the same as the input. ( )
6 A truth table shows all input/output combinations. ( )
7 The half adder circuit uses only OR gates. ( )
8 The full adder circuit considers carry bits. ( )
9 Input and output are part of logic gates. ( )
10 The output of a NOT gate for input 1 is 1. ( )

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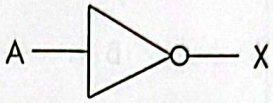
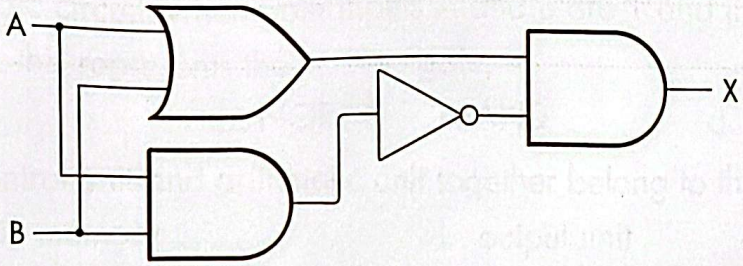
2 Answer the following questions:

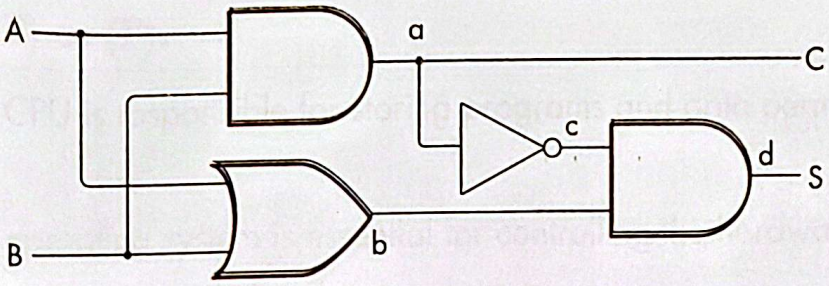
1 Name the following logic circuit and create a truth table.



2 A circuit was created by combining logic circuits as shown in the following diagram. In this case, create a truth table for inputs A, B, and output X.



3 In the following half adder circuit, determine the values of each output a to d when input A is 1 and input B is 1.



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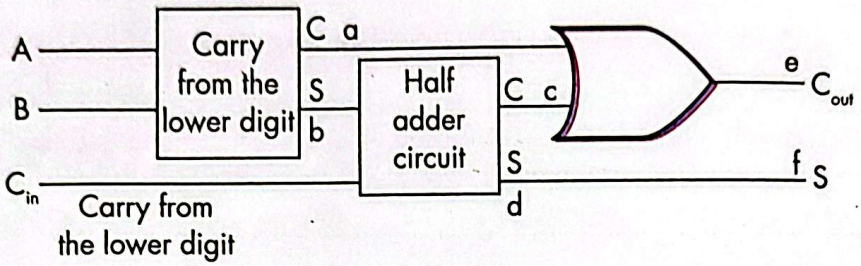
4 In the following full adder circuit, determine the values of each output a to f when input A is 1, input B is 0, and input C_{in} is 1.



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Model Exams on Chapter 7

Model Exam 1

1 Choose the correct answer:

1. The program responsible for managing hardware and software on a computer is called ..... .
   a. driver b. compiler
   c. application d. operating system
2. In a logic circuit, when both inputs A and B are 1 and the output X is also 1, this represents the ..... gate.
   a. OR b. NOR c. AND d. NOT
3. The control unit and arithmetic unit together belong to the ..... .
   a. main memory b. output unit
   c. CPU d. storage device
4. In a half adder circuit, if the input is A = 0 and B = 1, the output sum is ..... .
   a. 0 b. 1 c. 2 d. 3
5. A printer cannot be used until a/an ..... is installed.
   a. application b. device driver
   c. operating system d. compiler

2 Put (T) or (F):

1. The CPU is responsible for storing programs and data permanently. ( )
2. The operating system is essential for controlling the hardware. ( )
3. AND circuits output 1 only when both inputs are 1. ( )
4. The NOT circuit outputs the same value as its input. ( )
5. A full adder includes three inputs: A, B, and C in. ( )

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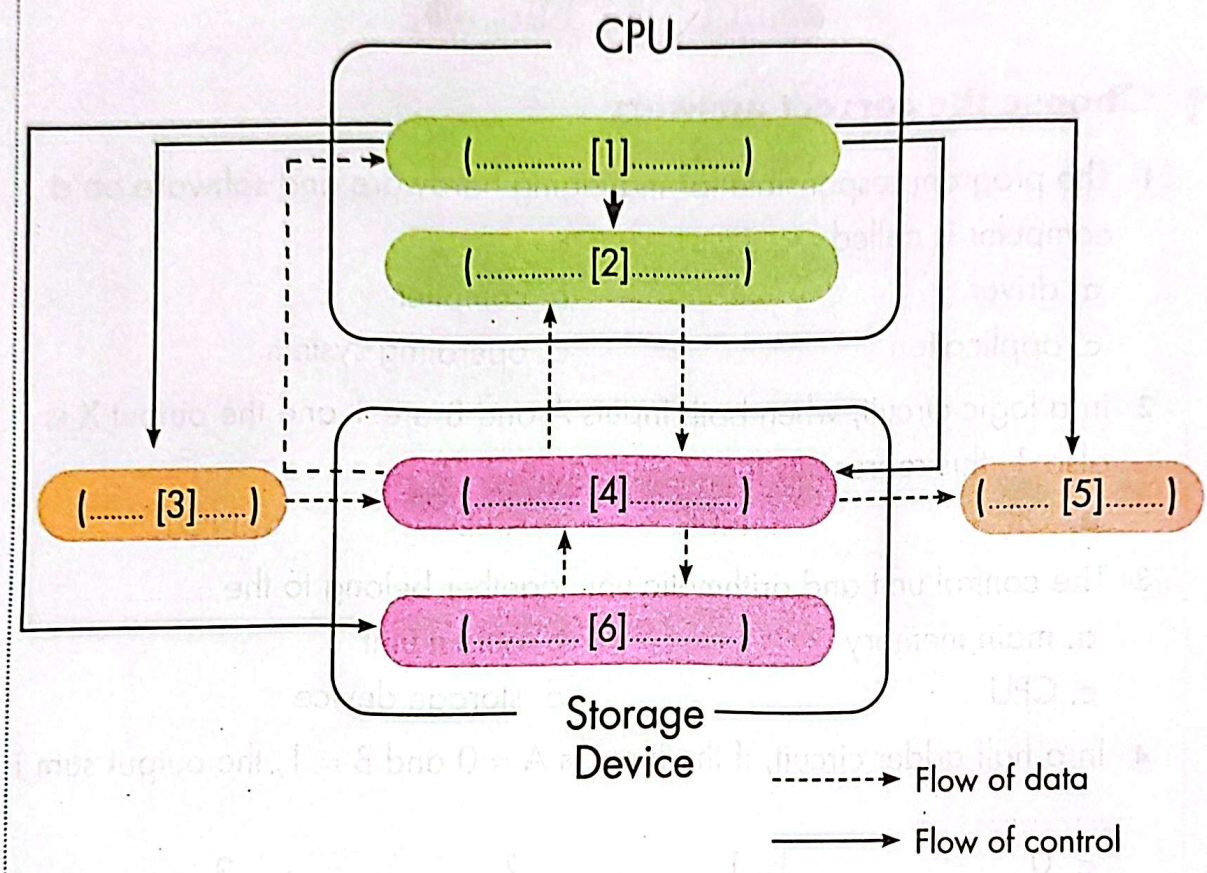
3 Replace the numbers in the diagram with the major components of a computer:



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Model Exam 2

1 Choose the correct answer:

1. A logic circuit outputs 1 when either A or B (or both) is 1, this represents the ..... gate.
   a. OR b. AND c. NOT d. NOR
2. Word processors and spreadsheet programs are examples of ..... .
   a. system software b. application software
   c. device drivers d. operating systems
3. ..... is a logic circuit that produces the inverse of its input value.
   a. NOT gate b. AND gate c. OR gate d. XOR gate
4. The part of the computer that executes instructions and issues commands is the ..... .
   a. arithmetic unit b. control unit c. output unit d. memory
5. In a half adder, if both inputs A and B are 1, the carry output is ..... .
   a. 0 b. 1 c. 2 d. undefined
6. Which of the following best describes the function of logic circuits?
   a. They store data permanently.
   b. They display information on the screen.
   c. They perform logical operations on binary inputs.
   d. They connect hardware components.
7. The most widely used interface for connecting computer peripherals like printers and external drives is ..... .
   a. USB b. HDMI c. Ethernet d. VGA
8. The full adder circuit differs from the half adder circuit because it includes ..... .
   a. XOR b. Carry input c. NAND d. NOR

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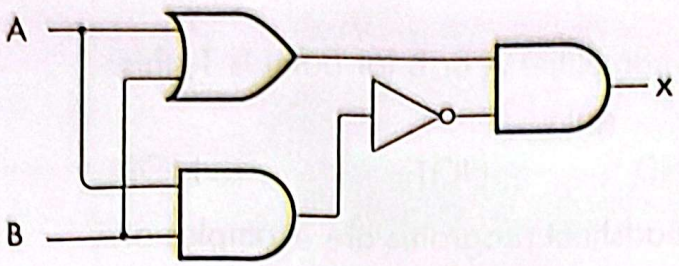
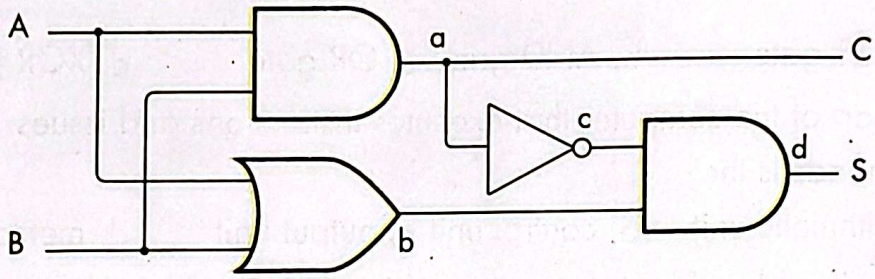
2 Complete the following truth table:



Input		Output
A	B	X

3 Determine the values of each output from a to d when input A is 1 and input B is 1.



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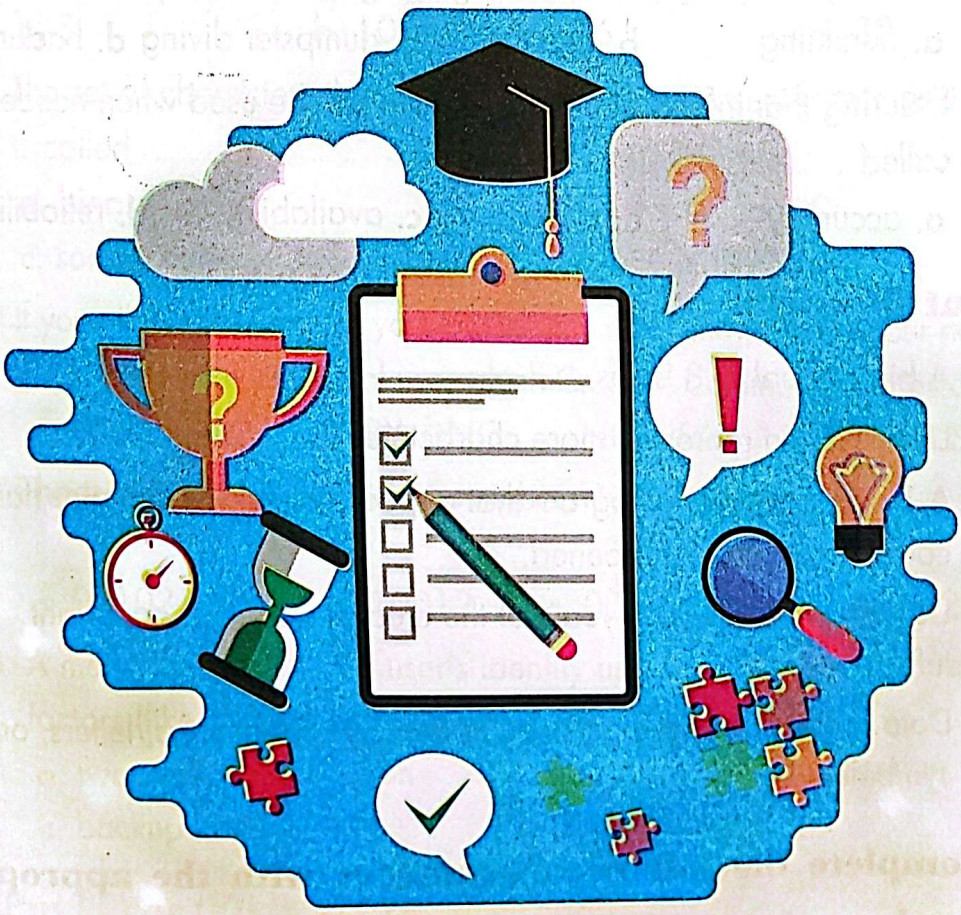
Final Exams



MODEL (1)

1 Choose the correct answer:

1. Television and radio are examples of ..... media.
   a. transmission b. recording c. expression d. storage
2. The hexadecimal digit "C" represents the decimal number ..... .
   a. 10 b. 11 c. 12 d. 13
3. Mr. Ali copied and distributed an e-book for his friends without a permission. This act is a violation of ..... .
   a. Copyright Law b. Privacy Policy
   c. Public Domain Rule d. Trademark
4. Reading company papers from garbage is an example of ..... .
   a. skimming b. cracking c. dumpster diving d. hacking
5. Ensuring that information and systems can be used when needed is called ..... .
   a. accuracy b. integrity c. availability d. reliability

2 Put (T) or (F):

1. A bit is equal to 8 bytes. ( )
2. Unicode can represent more characters than ASCII. ( )
3. A Trojan horse is a program that appears useful but contains harmful codes that run when opened. ( )
4. Using a work after 50 years of the creator's death is copyright infringement. ( )
5. Data are raw facts represented in the form of numbers, letters, or symbols. ( )

3 Complete the following sentences with the appropriate words or phrases:

1. Weather forecasts are an example of ..... .

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2 The process of converting continuous images into digital data is called ..... .

3 ..... is the general term for crimes involving misuse of computers or networks.

4 The false information deliberately spread or baseless rumors are called ..... .

5 ..... prevents people from using other's photos without their permission

MODEL (2)

1 Choose the correct answer:

1 The hexadecimal system is based on ..... digits.

a. 8 b. 10 c. 16 d. 32

2 The set of characters that computers use to represent letters and symbols is called ..... .

a. binary code b. character code

c. source code d. encryption code

3 If you allow others to use your photo only when they display your name and don't use it for commercial use, which Creative Commons licenses apply?

a. BY + ND b. BY + NC c. NC + SA d. ND + SA

4 The subtraction of the binary numbers: 11012 – 10102 is ..... .

a. 01102 b. 10012 c. 00112 d. 01012

5 A method of verifying a user's identity using two or more different factors (like a password and fingerprint) is called .....

a. two-step authentication b. two-factor authentication

c. backup d. decryption

2 Put (T) or (F):

1 Binary numbers use the digits 0 and 2. ( )

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2 ASCII and Unicode are examples of character encoding systems. ( )
3 Phishing is a secure method to verify identity online. ( )
4 Quoted material must always be enclosed in quotation marks. ( )
5 The protection period for a patent right is 7 years from the application. ( )

3 Write the scientific term:

1 It means checking information from several sources to confirm it is true. (.....)
2 It is a pictorial symbol designed for the purpose of conveying information without using words. (.....)
3 It is a method where services are not provided without a user's consent. (.....)
4 It is a method of representing numbers using ten digits from "0" to "9". (.....)
5 It is the part of the CPU that performs calculations and logical operations. (.....)

MODEL (3)

1 Choose the correct answer:

1 Keeping data correct and unchanged is called ..... .
a. confidentiality b. integrity c. availability d. accuracy

2 Sharing a person's photo online without consent violates the ..... .
a. privacy rights b. copyright c. patent rights d. fair use

3 A ..... executes a computer's instructions and issues commands to each function.
a. mouse b. keyboard c. control unit d. printer

4 Persuading a person to reveal confidential information such as passwords is known as ..... .
a. spoofing b. social engineering
c. encryption d. phishing

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5 Omar translated a Spanish story into Arabic and published it without permission. This action is ..... .

a. copyright infringement
b. fair use
c. public right
d. patent violation

2 Put (T) or (F):

1 Phishing is a scam method used to steal personal information. ( )
2 Works created by children or amateurs cannot be copyrighted. ( )
3 Intellectual property rights protect ideas and creative works. ( )
4 Personal information can be freely shared without consent. ( )
5 A firewall helps prevent unauthorized network access. ( )

3 Correct the underlined words:

1 Copyrights are granted only after official registration at the Patent Office.
(.....)

2 Primary information is data collected from newspapers, websites, and books.
(.....)

3 Copyright protects product names, logos, text, and sound.
(.....)

4 Privacy mark protects the economic value of a celebrity's likeness.
(.....)

5 A main memory used for long-term storage of programs and data.
(.....)

MODEL (4)

1 Choose the correct answer:

1 The smallest unit of data in a computer is the ..... .

a. word
b. byte
c. file
d. bit

2 Which of the following ensures only authorized people can access information?

a. Availability
b. Confidentiality
c. Accuracy
d. Reproducibility

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3 The hexadecimal digit "A" represents the decimal number ..... .

a. 8 b. 9 c. 10 d. 11

4 ASCII and Unicode are examples of ..... .

a. file types b. character codes

c. logic circuits d. input devices

5 Devices such as the main computer unit and peripheral devices are called ..... .

a. software b. hardware c. storage disks d. input devices

2 Put (T) or (F):

1 The binary system uses the two digits: 0 and 1. ( )

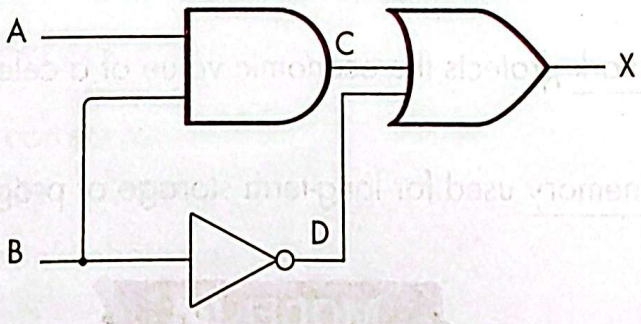
2 You can post family group photos online without permission. ( )

3 Character corruption occurs due to mismatched encoding and decoding methods. ( )

4 The CPU and main memory are both part of a computer's hardware. ( )

5 Logic gates perform mathematical operations using letters. ( )

3 Create the truth table:



A	B	C	D	X

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4 Convert the following binary numbers into decimals:

Binary	Decimal
1010	.....
1111	.....

MODEL (5)

1 Choose the correct answer:

1 ..... is/are the concepts and attitudes necessary for conducting appropriate activities in the information society.

a. Communication skills b. Media literacy
c. Online bullying d. Information ethics

2 Which of the following is NOT considered personal information?

a. Home address b. Birth date
c. Weather forecast d. Student ID number

3 ..... is a method that allows only authorized users to access computer systems or data.

a. Encryption b. Access control
c. Backup d. Firewall

4 A strong password should contain ..... .

a. numbers b. letters c. symbols d. all of them

5 The most widely used interface for computer peripheral devices is ..... .

a. HDMI b. USB c. LPT1 d. Hub

2 Put (T) or (F):

1 You must infringe others' privacy. ( )
2 Creative Commons License allows creators to share works with conditions. ( )
3 Unicode can represent characters from multiple languages worldwide. ( )
4 The smallest unit that composes an image is a bit. ( )
5 Decimal is a method of representing numbers using ten digits, from "0" to "9". ( )

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3 Write the scientific term:

1. It is a state where one becomes excessively immersed in the Internet. (.....)
2. It protects designs, shapes, and patterns of products. (.....)
3. It is the process of converting images, sound, or text into digital data. (.....)
4. They are the rights granted to individuals or entities who communicate or transmit copyrighted works. (.....)
5. It is a scam in which a person receives a bill for a service they never used. (.....)

MODEL (6)

1 Choose the correct answer:

1. The property that allows data to be duplicated in large quantities is called ..... .
   a. durability b. reproducibility
   c. scarcity d. confidentiality
2. Uploading a photo of your friend without their consent mainly violates the ..... .
   a. copyright b. public access law
   c. privacy d. fair use
3. A patent rights protect ..... .
   a. music composition b. inventions and technical ideas
   c. brand logos d. photographs
4. A virus infection, data leak, or phishing attack are examples of ..... .
   a. information security threats b. database queries
   c. social media ethics d. encryption standards
5. The part of the computer responsible for executing instructions and issuing commands is the ..... .
   a. memory b. input units c. CPU d. output devices

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2 Put (T) or (F):

1. Primary information is obtained through direct observation or experience. ( )
2. Personal information can always be shared freely on the Internet. ( )
3. Creative Commons License allows creators to decide how others may reuse their work. ( )
4. Spoofing means pretending to be another person or organization online. ( )
5. The hexadecimal system uses the digits 0–9 and A–F. ( )

3 Match each item in Column A with its correct description in Column B:

Column (A)	Column (B)
1 Media literacy	a. is a computer storage device that temporarily stores data.
2 Act on the Protection of Personal Information	b. is the ability to interpret and evaluate media content.
3 Copyright	c. protects creative works and follows the Non-Formality Principle.
4 Main memory	d. is a law that manages the handling of personal data.
5 Firewall	e. is the software barrier that prevents unauthorized network access.

1 ..... 2 ..... 3 ..... 4 ..... 5 .....

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MODEL (7)

1 Choose the correct answer:

1. The special care-required information includes .....
   a. race and creed b. name and gender
   c. phone number d. dates of birth
2. The patent rights protection period is .....
   a. 7 years b. 10 years c. 20 years d. 50 years
3. When the system software is not updated, attackers can use ..... to steal data.
   a. firewalls b. security holes
   c. passwords d. codes
4. The software that secretly monitors a user's behavior or collects data without consent is called .....
   a. spyware b. worm c. Trojan horse d. antivirus
5. Which of the following is considered a primary source of information?
   a. A school textbook b. A personal experience report
   c. A daily newspaper d. A television program

2 Put (T) or (F):

1. The CPU is considered a type of software. ( )
2. The Creative Commons mark (BY) means no commercial use. ( )
3. Utility Model Rights protect a product's shape or structure for 7 years ( )
4. In the objection system, users must give consent before data collection. ( )
5. Quotation allows using a portion of another person's work without permission. ( )

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3 Match each description in Column A with the correct word in Column B:

Column (A)	Column (B)
1 It is the software that allows the operating system to communicate with the hardware.	a. Skimming
2 It is the exclusive right given to inventors for new technologies or inventions.	b. Driver
3 It is extracting data from someone's credit or debit card.	c. Patent rights
4 It is the information that includes the location embedded in photos and videos.	d. Peripheral devices
5 They are devices such as printers, scanners, and monitors that connect externally to the computer.	e. Geotagging

1 ..... 2 ..... 3 ..... 4 ..... 5 .....

MODEL (8)

1 Choose the correct answer:

1 Which of the following rights protect celebrities' economic benefits?

a. Privacy rights b. Portrait rights
c. Publicity rights d. Copyrights

2 ..... is an example of a personal identification code.

a. Name b. Address c. Nationality d. Passport number

3 The hexadecimal number "1F" equals ..... in decimal.

a. 15 b. 17 c. 31 d. 33

4 A type of system software responsible for the basic functions of a computer is called ..... .

a. an operating system b. a device driver
c. application software d. a logic gate

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5 Which of the following allows using copyrighted works without permission?

a. Copying and distributing CDs to friends
b. Performing songs at a paid concert
c. Quoting parts of a book in a report
d. Uploading commercial movies online

2 Put (T) or (F):

1 Skimming is a legal way to collect card information. ( )
2 Using statistical data in a school report is copyright infringement. ( )
3 ASCII can represent all characters of every language. ( )
4 Personal information should only be disclosed with consent. ( )
5 The CPU is an example of output hardware. ( )
6 Shoulder surfing means watching someone type a password. ( )

3 Replace the numbers with the correct terms:

Mark	Condition	Content
	(.....[1].....)	Display the title of the work and name of the creator.
	Non-commercial	Do not use for (.....[2].....) purposes.
	(.....[3].....)	Do not alter the original copyrighted work.
	(.....[4].....)	Publish under the same combination of licenses as the original work.

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MODEL (9)

1 Choose the correct answer:

1. The sum of the binary numbers $0101_2 + 1010_2$ is ..... .
   a. 1100_2 b. 1111_2 c. 1001_2 d. 1011_2
2. A principle for organizing and presenting information to be easily understood is the ..... .
   a. hierarchy method b. category rule
   c. LATCH method d. encoding system
3. Which of the following is an example of knowledge-based authentication?
   a. Fingerprint b. Smart card
   c. Password and PIN d. SMS verification
4. When quoting a passage, you must ..... .
   a. use quotation marks b. credit the creator
   c. modify the text d. both a and b
5. The correct representation of the decimal number 39 in binary is ..... .
   a. 110001_2 b. 100111_2 c. 111000_2 d. 101101_2

2 Put (T) or (F):

1. Malware includes viruses, worms, and Trojan horses. ( )
2. Two-factor authentication combines at least two different methods to verify your identity. ( )
3. Selling T-shirts with a celebrity's photo is acceptable. ( )
4. Copyrights require registration at the Patent Office to be valid. ( )
5. Visualization of information makes data harder to understand. ( )

3 Complete the following sentences:

1. ..... is a communication standard used in wired LANs to connect devices such as computers and routers.
2. A digital image is represented by an arrangement of small units called ..... .

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3 ..... is the Creative Commons symbol that means 'do not modify or alter the original work'.

4 The image digitization steps consequently are ....., ..., and ..... .

5 The unauthorized use of copyrighted material is called ..... .

MODEL (10)

1 Choose the correct answer:

1 The part of a computer that performs calculations and logical operations is the ..... .

a. control unit b. memory unit
c. arithmetic unit d. input device

2 The hexadecimal number "2A" equals ..... in decimal.

a. 32 b. 42 c. 48 d. 36

3 The process of changing analog images into digital data is called ..... .

a. quantization b. digitization c. transmission d. compression

4 The right that gives creators control over the reproduction and distribution of their work is the ..... .

a. patent b. license c. trademark d. copyright

5 The malicious software that hides inside useful programs to harm a system is a ..... .

a. Trojan horse b. worm c. virus d. encryption key

2 Put (T) or (F):

1 The (SA) condition requires publishing modified works under the same license. ( )

2 CUI is easier to use than GUI. ( )

3 Digitization allows analog signals like sounds and images to be stored on computers. ( )

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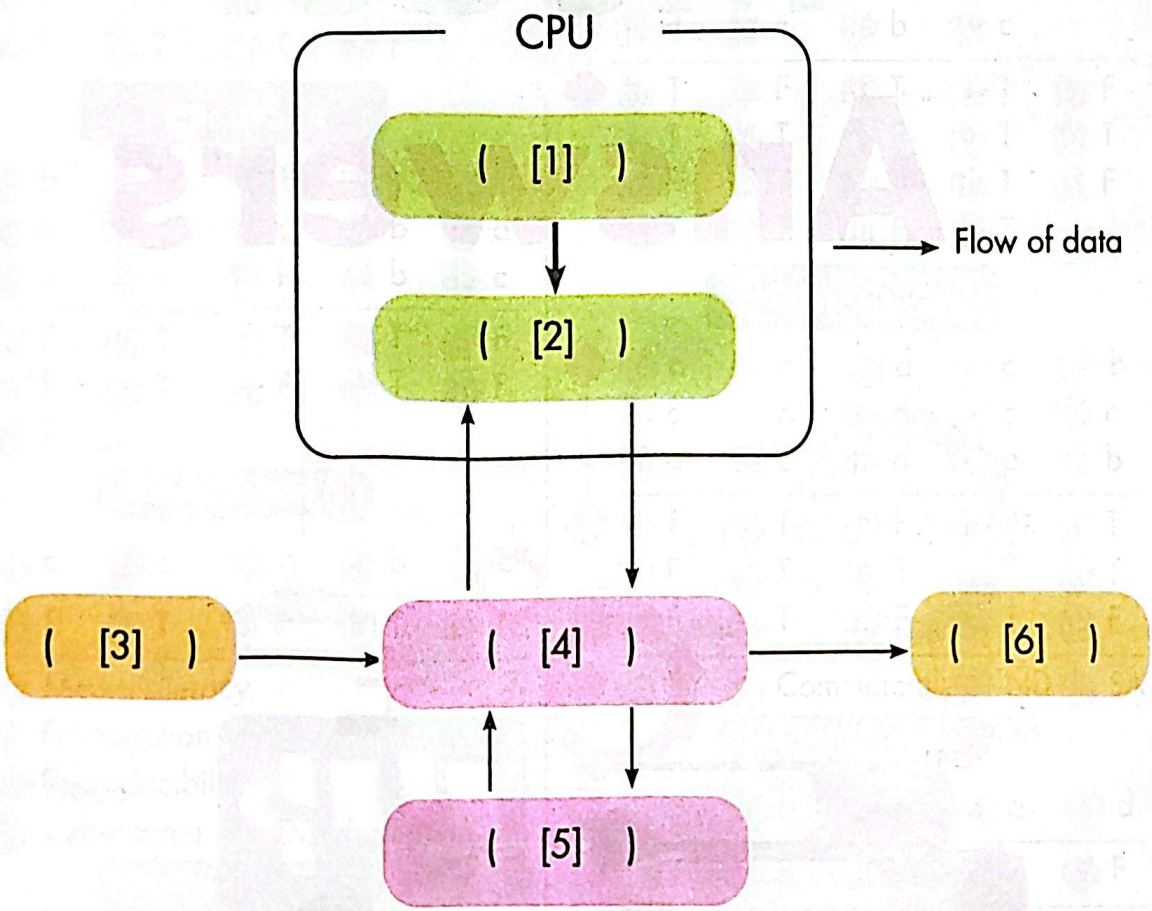
4 Raster format appears smooth when enlarged. ( )

5 The complement of a number is always smaller than the number itself. ( )

3 Complete the following diagram, then mention the functions of the five major components of a computer:



.....

.....

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.....

.....

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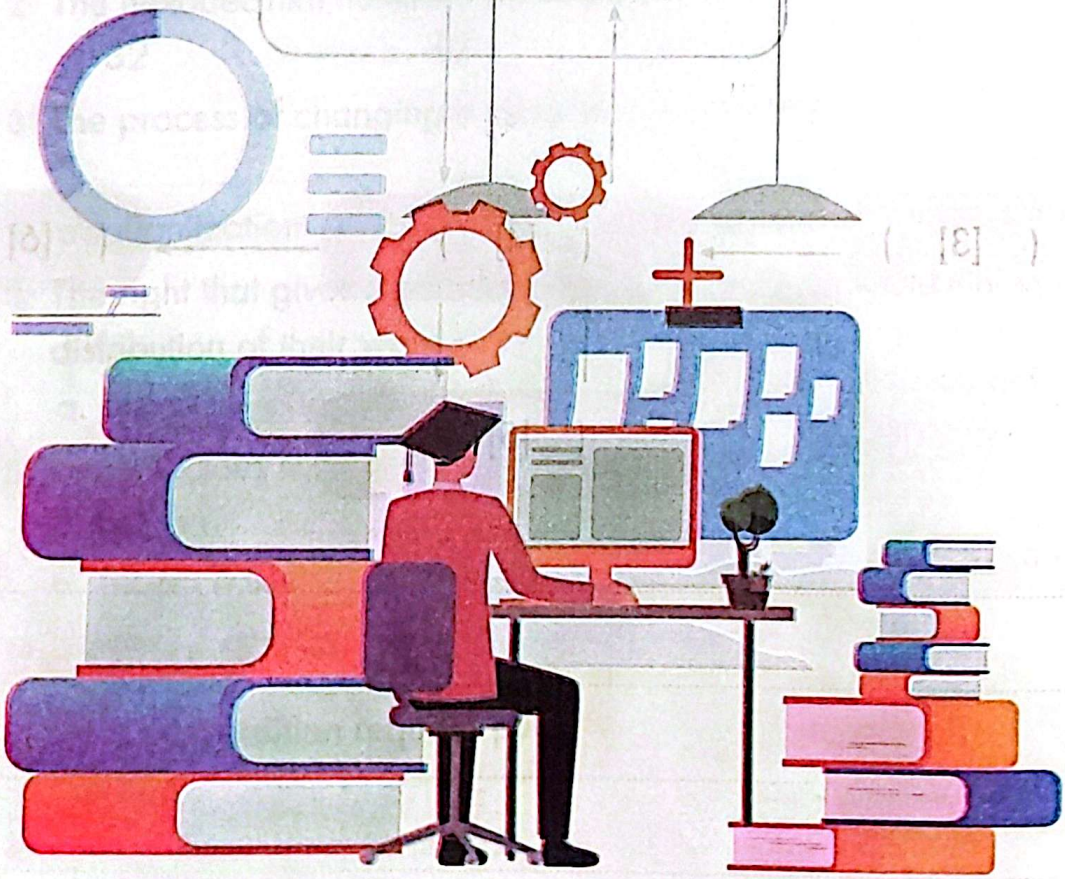
Model Answers



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Chapter 1

Lesson 1

1 b 2 a 3 b 4 b 5 c
6 b 7 b 8 a 9 b 10 b
11 c 12 c 13 c 14 b 15 a

1 T 2 F 3 F 4 F 5 T
6 T 7 F 8 F 9 T 10 F
11 F 12 T 13 T 14 F

Lesson 2

1 b 2 b 3 b 4 c 5 b
6 b 7 d 8 c 9 b 10 a
11 a 12 c 13 b 14 b 15 c

1 F 2 T 3 T 4 T 5 F
6 T 7 T 8 F 9 T 10 F
11 T

Model Exam 1

1 c 2 c 3 a 4 b 5 c

1 F 2 T 3 F 4 T 5 T

1 Media Literacy
2 Propagation
3 Reproducibility
4 Cybercrime 5 Disinformation

Model Exam 2

1 b 2 c 3 a 4 b 5 b

1 F 2 T 3 F 4 F 5 T

1 c 2 e 3 d 4 b 5 a

Chapter 2

Lesson 1

1 b 2 a 3 b 4 c 5 d
6 b 7 d 8 c 9 b 10 b
11 b 12 a 13 b 14 c 15 a
16 c 17 a 18 c

1 T 2 F 3 F 4 T 5 F
6 F 7 T 8 F 9 T 10 F
11 F 12 T 13 F 14 F 15 T

Lesson 2

1 c 2 a 3 d 4 a 5 b
6 c 7 d 8 d 9 b 10 b
11 c 12 b 13 c 14 a 15 c
16 d 17 c 18 b 19 c

1 T 2 F 3 T 4 T 5 F
6 T 7 T 8 F 9 T 10 T
11 F 12 T 13 T 14 T 15 F
16 T 17 T 18 F 19 T

Lesson 3

1 a 2 c 3 a 4 c 5 b
6 c 7 c 8 d 9 c 10 c
11 a 12 c 13 d 14 a 15 b

1 F 2 T 3 F 4 T 5 T
6 F 7 T 8 T 9 T 10 T
11 F 12 T 13 F 14 T 15 F

1 BY 2 Commercial 3 ND 4 SA

Model Exam 1

1 c 2 b 3 a 4 a 5 d

1 T 2 F 3 T 4 T 5 F

1 Personal Information
2 Prior Approval System
3 Patent Rights 4 Quotation
5 Copyright Infringement

Model Exam 2

1 a 2 c 3 b 4 d 5 d

1 T 2 F 3 T 4 F 5 F

1 Objection System
2 Privacy right 3 Copyrights
4 do not require 5 ND

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Model Exam 3

1 1 d 2 a 3 b 4 a 5 c

2 1 F 2 T 3 F 4 F 5 T

3 1 d 2 c 3 e 4 a 5 b

Chapter 3

Lesson 1

1 1 b 2 c 3 c 4 a 5 c
6 d 7 b 8 c 9 c 10 b
11 a 12 b 13 d 14 a 15 b
16 d 17 c 18 c

2 1 T 2 F 3 T 4 T 5 F
6 F 7 T 8 T 9 T 10 T
11 T 12 F 13 T 14 T 15 T

3 1 information security
2 Confidentiality 3 Trojan horse
4 Keylogger 5 Ransomware

Lesson 2

1 1 d 2 c 3 a 4 b 5 c
6 c 7 a 8 b 9 c 10 c
11 b 12 b 13 b 14 a 15 c
16 b

2 1 T 2 F 3 F 4 T 5 T
6 T 7 T 8 F 9 T 10 T
11 T 12 F 13 T 14 F 15 T
16 F 17 F 18 T

Lesson 3

1 1 a 2 b 3 d 4 d 5 c
6 a 7 a 8 b 9 b 10 b
11 d 12 c 13 a 14 c

2 1 T 2 F 3 T 4 F 5 T
6 T 7 T 8 F 9 T 10 F
11 F 12 T 13 F 14 F 15 T

Lesson 4

1 1 b 2 a 3 d 4 a 5 d
6 a 7 d 8 b 9 d 10 b
11 b 12 b 13 c 14 b 15 c
16 c 17 a

2 1 T 2 F 3 F 4 T 5 T
6 T 7 F 8 T 9 T 10 T
11 F 12 T 13 T 14 T 15 F

Lesson 5

1 1 c 2 b 3 c 4 d 5 d
6 a 7 c 8 b 9 a 10 c
11 d 12 b 13 c 14 b 15 a
16 a 17 d

2 1 T 2 F 3 T 4 F 5 T
6 T 7 F 8 T 9 T 10 T
11 F 12 T 13 T 14 F 15 T

Model Exam 1

1 1 c 2 b 3 c 4 b 5 d

2 1 T 2 T 3 F 4 T 5 F

3 1 d 2 a 3 e 4 b 5 c

Model Exam 2

1 1 b 2 a 3 c 4 b 5 d

2 1 F 2 T 3 T 4 T 5 F

3 1 Knowledge-based
2 Two-step 3 unauthorized
4 Carelessness
5 Credit/debit card

Model Exam 3

1 1 a 2 c 3 c 4 b 5 a

2 1 F 2 T 3 T 4 F 5 F

3 1 One-click fraud 2 Phishing
3 Information security policy
4 Security holes
5 Possession-based authentication

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Chapter 4

Lesson 1

1 1 b 2 a 3 d 4 d 5 d
6 b 7 b 8 b 9 d 10 c
11 a 12 b 13 a 14 d

2 1 T 2 T 3 T 4 F 5 T
6 F 7 T 8 F 9 F 10 F
11 T 12 F 13 T 14 T

Chapter 5

Lesson 1

1 1 b 2 b 3 c 4 b 5 b
6 c 7 a 8 c 9 b 10 b

2 1 T 2 F 3 T 4 F 5 T
6 T 7 F 8 T 9 F 10 F

Lesson 2

1 1 a 2 a 3 c 4 a 5 a
6 a 7 a 8 b 9 b 10 c

2 1 F 2 T 3 T 4 F 5 T
6 F 7 F 8 T 9 F 10 T

Lesson 3

1 1 a 2 a 3 a 4 a 5 a
6 a 7 a 8 a 9 a 10 a
11 a 12 a 13 a

2 1 F 2 F 3 T 4 T 5 F
6 T 7 F 8 F 9 F 10 T

Chapter 6

Lesson 1

1 1 b 2 c 3 a 4 c 5 c
6 b 7 b 8 b 9 c 10 a

2 1 F 2 T 3 F 4 T 5 F
6 F 7 T 8 F 9 T 10 F

Lesson 2

1 1 b 2 c 3 c 4 b 5 b
6 a 7 c 8 b 9 b 10 b
11 b 12 c 13 b 14 c 15 b

2 1 F 2 T 3 F 4 T 5 F
6 T 7 F 8 T 9 T 10 T
11 F 12 T 13 T 14 F

3 1 A.5 B. 21 C. 45
2 A. 1101 B. 10000000
C. 10001010

Lesson 3

1 1 c 2 c 3 b 4 a 5 c
6 a 7 c 8 b 9 b 10 a
11 c 12 b 13 c 14 c 15 b

2 1 F 2 T 3 T 4 T 5 F
6 T 7 T 8 F 9 F 10 T

3 1 A. $DB_{(16)}$ B. $F6_{(16)}$
C. $10011110_{(2)}$
2 A. 165

Lesson 4

1 1 c 2 b 3 a 4 b 5 b
6 b 7 c 8 b 9 c 10 b
11 b 12 c 13 b 14 a 15 c

2 1 F 2 T 3 T 4 F 5 T
6 T 7 F 8 T 9 F 10 T
11 T 12 F 13 T 14 F 15 T

Lesson 5

1 1 a 2 b 3 c 4 b 5 b
6 a 7 b 8 b 9 a 10 b
11 b 12 a 13 b 14 a 15 c

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2 1 T 2 T 3 F 4 F 5 F
6 T 7 T 8 T 9 T 10 F

3 1 $1011_{(2)}$ 2 $1111_{(2)}$
3 $1011_{(2)}$ 4 $0101_{(2)}$

Lesson 6

1 1 b 2 a 3 b 4 c 5 d
6 b 7 a 8 c 9 b 10 c
11 b 12 b 13 c 14 c 15 c

2 1 F 2 F 3 F 4 T 5 T
6 F 7 T 8 T 9 F 10 T

3 1 A. $1001_{(2)}$ B. $0101_{(2)}$
C. $01100101_{(2)}$
D. $00111010_{(2)}$
2 A. $0100_{(2)}$ B. $0010_{(2)}$
C. $1010_{(2)}$

Lesson 7

1 1 a 2 b 3 a 4 b 5 b
6 b 7 b 8 a 9 a 10 c
11 b 12 b 13 a 14 b

2 1 T 2 F 3 T 4 F 5 T
6 F 7 T 8 T 9 T 10 F
11 T 12 T 13 F 14 T

Lesson 8

1 1 c 2 b 3 b 4 c 5 c
6 b 7 b 8 b 9 b 10 c
11 b 12 b 13 c 14 b 15 c

2 1 F 2 T 3 F 4 T 5 T
6 F 7 T 8 F 9 T 10 F
11 T 12 T 13 F 14 F 15 T

Lesson 9

1 1 b 2 c 3 b 4 c 5 b
6 c 7 b 8 c 9 c 10 c
11 c 12 c 13 b 14 b 15 c

2 1 F 2 T 3 F 4 T 5 F
6 T 7 F 8 T 9 T 10 F
11 T 12 T 13 F 14 F 15 T

Lesson 10

1 1 b 2 b 3 b 4 b 5 c
6 b 7 a 8 c 9 b 10 a
11 b 12 a 13 c 14 b 15 d

2 1 T 2 F 3 T 4 F 5 F
6 T 7 F 8 T 9 T 10 F
11 T 12 F 13 F 14 F 15 T

Model Exam 1

1 1 d 2 c 3 b 4 a 5 d
6 c 7 d

2 1 F 2 T 3 F 4 T 5 T
6 F 7 T 8 T

Model Exam 2

1 1 c 2 b 3 b 4 d 5 c
6 a 7 c 8 a

2 1 T 2 F 3 T 4 T 5 F
6 T 7 F

Model Exam 3

1 1 d 2 c 3 b 4 c 5 a
6 c 7 d

2 1 T 2 F 3 T 4 T 5 F
6 T 7 T 8 T

Chapter 7

Lesson 1

1 1 c 2 c 3 c 4 b 5 c
6 c 7 c 8 c 9 c 10 b
11 b 12 a 13 b 14 c 15 c

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2 1 T 2 F 3 F 4 T 5 F
6 T 7 T 8 F 9 T 10 F

Lesson 2

1 1 b 2 c 3 b 4 c 5 c
6 d 7 b 8 b 9 c 10 b
11 d 12 b 13 c 14 b 15 c

2 1 F 2 T 3 F 4 T 5 F
6 T 7 F 8 T 9 F 10 T

Lesson 3

1 1 c 2 b 3 b 4 c 5 c
6 b 7 b 8 c 9 b 10 c
11 d 12 b 13 b 14 b 15 a

2 1 T 2 F 3 T 4 F 5 F
6 T 7 F 8 T 9 T 10 F

3 1 Gate: NOT gate (inverter)
TT:

Input A	Output X
0	1
1	0

2

A	B	A OR B	A AND B	NOT (A AND B)	X)
0	0	0	0	1	0
0	1	1	0	1	1
1	0	1	0	1	1
1	1	1	1	0	0

3 a = 1 b = 1 c = 0 d = 0
(carry C = 1, sum S = 0).

4 a=0 b=1 c=1
d=0 e=1 f=0

Model Exam 1

1 1 d 2 c 3 c 4 b 5 b

2 1 F 2 T 3 T 4 F 5 T

3 1 Control unit 2 Arithmetic unit
3 Input device 4 Main memory
5 Output device
6 Secondary memory

Model Exam 2

1 1 a 2 b 3 a 4 b 5 b
6 c 7 a 8 b

2

Input		Output
A	B	X
0	0	0
0	1	1
1	0	1
1	1	0

3

A	B	a	b	c	d
1	1	1	1	0	0

Final Exams Answers

MODEL (1)

1 1 a 2 c 3 a 4 c 5 c

2 1 F 2 T 3 T 4 F 5 T

3 1 knowledge 2 Digitization
3 Cybercrime 4 Disinformation
5 Image right

MODEL (2)

1 1 c 2 b 3 b 4 c 5 b

2 1 F 2 T 3 F 4 T 5 F

3 1 Cross-checking 2 Pictogram
3 Prior Approval System
4 Decimal
5 Arithmetic Unit

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MODEL (3)

1. 1 b 2 a 3 c 4 b 5 a
2. 1 T 2 F 3 T 4 F 5 T
3. 1 Industrial Property Rights
   2 Secondary information
   3 Trademark rights
   4 Publicity right
   5 Secondary memory

MODEL (4)

1. 1 d 2 b 3 c 4 b 5 b
2. 1 T 2 F 3 T 4 T 5
3.

A	B	C	D	X
0	0	0	1	1
0	1	0	0	0
1	0	0	1	1
1	1	1	0	1

4. 10 15

MODEL (5)

1. 1 d 2 c 3 b 4 d 5 b
2. 1 F 2 T 3 T 4 F 5 T
3. 1 Internet addiction
   2 Design Rights
   3 Digitization
   4 Neighboring Rights
   5 Fraudulent Billing

MODEL (6)

1. 1 b 2 c 3 b 4 a 5 c
2. 1 T 2 F 3 T 4 T 5 T
3. 1 b 2 d 3 c 4 a 5 e

MODEL (7)

1. 1 a 2 c 3 b 4 a 5 b
2. 1 F 2 F 3 T 4 F 5 T
3. 1 b 2 c 3 a 4 e 5 d

MODEL (8)

1. 1 c 2 d 3 c 4 a 5 c
2. 1 F 2 F 3 F 4 T 5 F 6 T
3. 1 BY 2 Commercial
   3 ND 4 SA

MODEL (9)

1. 1 b 2 c 3 c 4 d 5 b
2. 1 T 2 T 3 F 4 F 5 F
3. 1 Ethernet 2 Pixels
   3 ND
   4 Sampling, Quantization, Encoding
   5 Copyright Infringement

MODEL (10)

1. 1 c 2 b 3 b 4 d 5 a
2. 1 T 2 F 3 T 4 F 5 F
3. 1 Control Unit: It directs and coordinates operations.
   2 Arithmetic Unit: It performs calculations and logic operations.
   3 Input Unit: It enters data into the computer.
   4 Main Memory: It temporarily stores programs and data.
   5 Secondary Memory: It is used for long-term storage.
   6 Output Unit: It displays or prints processed data.

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